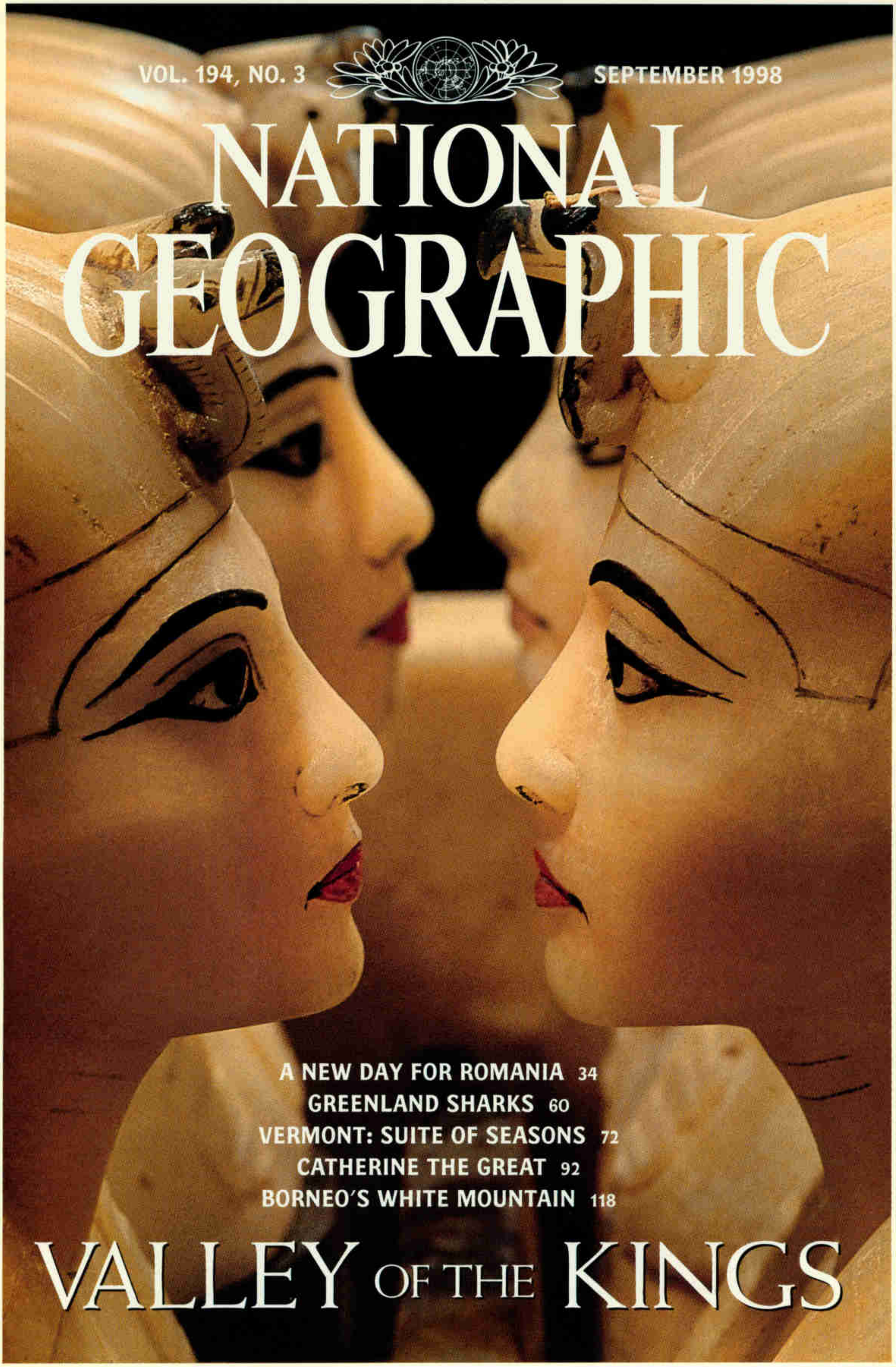
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NATIONAL GEOGRAPHIC



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VALLEY OF THE KINGS

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Marsh Deer *(Blastocerus dichotomus)* **Size:** Shoulder height, 100 - 120 cm **Weight:** Approx. 80 - 125 kg **Habitat:** Marshes and seasonally flooded riverine areas in central South America **Surviving number:** Estimated at not more than 20,000
Photographed by André Bärtschi

WILDLIFE AS CANON SEES IT

On a Bolivian savanna, a young male marsh deer enjoys the fresh grass generated by seasonal rains, while a tyrant flycatcher snatches insects stirred up by the deer. Built for jumping, marsh deer have thin legs and strong haunches; long hooves, with spreading toes, facilitate travel on soft ground. Large preorbital scent glands near the eye are a distinct feature of marsh deer, as are their broad ears and relatively thick antlers. Habitat destruction, hunting pressures and high susceptibility to cattle diseases contribute to the rarity of this largest of South American deer. As a global corporation committed to social and environmental concerns, we join in worldwide efforts to promote greater awareness of endangered species for the benefit of future generations.

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NATIONAL GEOGRAPHIC

SEPTEMBER 1998

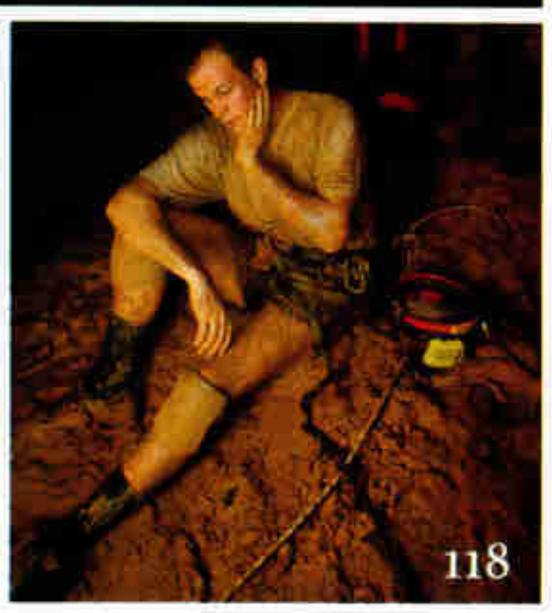

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2 **Valley of the Kings** *In a narrow valley near Luxor Egyptologists are excavating a royal tomb of unprecedented size, revealing new details of the lives of the pharaohs 3,000 years ago.*
BY KENT R. WEEKS PHOTOGRAPHS BY KENNETH GARRETT
ART BY CHRISTOPHER A. KLEIN

34 **A New Day for Romania** *With the execution of dictator Nicolae Ceauşescu on Christmas Day, 1989, Romania threw off repressive communist rule. Now the nation struggles to find its place in a free-market, democratic Europe.*
BY ED VULLIAMY PHOTOGRAPHS BY ALEXANDRA AVAKIAN

60 **Greenland Sharks** *Lurking beneath the Arctic ice, huge sharks consume seals and other large prey as if they were mere morsels. For the first time these sluggish, nearly blind creatures are photographed in their frigid habitat.*
ARTICLE AND PHOTOGRAPHS BY NICK CALOYIANIS

72 **Vermont: Suite of Seasons** *Ever changing, ever the same, a far corner of the Green Mountain State known as the Northeast Kingdom qualifies as a special place to a longtime resident.*
BY EDWARD HOAGLAND PHOTOGRAPHS BY MICHAEL YAMASHITA

92 **Catherine the Great** *Overthrowing her husband, Peter III, a German princess became Empress of Russia in 1762 and embarked on a 34-year campaign of empire building.*
BY ERLA ZWINGLE PHOTOGRAPHS BY SISSE BRIMBERG

118 **Borneo's White Mountain** *Riddled with networks of unexplored caves, 3,161-foot Gunung Buda harbors a wealth of plant and animal species in its depths and on its rain-forested slopes.*
BY DONOVAN WEBSTER PHOTOGRAPHS BY STEPHEN ALVAREZ

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The Cover

Found in the tomb of Tutankhamun, an alabaster container with finely carved stoppers carried the pharaoh's internal organs, preserved with natron, into the afterlife. Photograph by Kenneth Garrett

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Caravan The New Dodge

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This assignment started in a flea market and ended in a national shrine.

This class boat trip to Ellis Island actually began at a flea market in Rhode Island, where ninth-grade teacher Maureen Whalen Spaight bought a package of old immigrant photographs for $3.00. Later, she had each of her students pick one of the photos and develop a character based on it.



Her students then completely immersed themselves in the immigrant experience by creating journals for each of their immigrant characters. These journals recorded the characters' reasons for immigrating, their doubts, their dreams and the difficulties they and their companions faced as they began life in their adopted country.



For showing her students that a picture truly is worth a thousand words, State Farm is proud to present Maureen Spaight of E. R. Martin, Jr. High School of East Providence, Rhode Island with our Good Neighbor Award and to donate $5,000 to the educational institution of her choice.

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NATIONAL GEOGRAPHIC

Behind the Scenes



JASON Project Makes a Big Splash

This year we helped put two million schoolchildren underwater—but we didn't get them wet. As an annual sponsor of deep-sea explorer Bob Ballard's JASON Project, the Society hosts thousands of young argonauts at our Grosvenor Auditorium each spring, one of 30 sites in the U.S. and three other countries. While their aquatic-themed art (below) lines our walls, the kids settle in to interact with scientists in live transmissions from the field (above). Last March divers at California's Monterey Bay Aquarium (top) talked to the audience about undersea habitats. Washington visits are the culmination of months of study on a particular theme. Research begins soon after school starts. In 1998-99 the JASON Project celebrates its tenth anniversary with a rain forest theme. And next spring? Our argonauts will get their feet wet in the Amazon.





CLAY WISEMAN (TOP); MARK THIESSEN, NGS (ABOVE); ZACHARY PRZYSTUP

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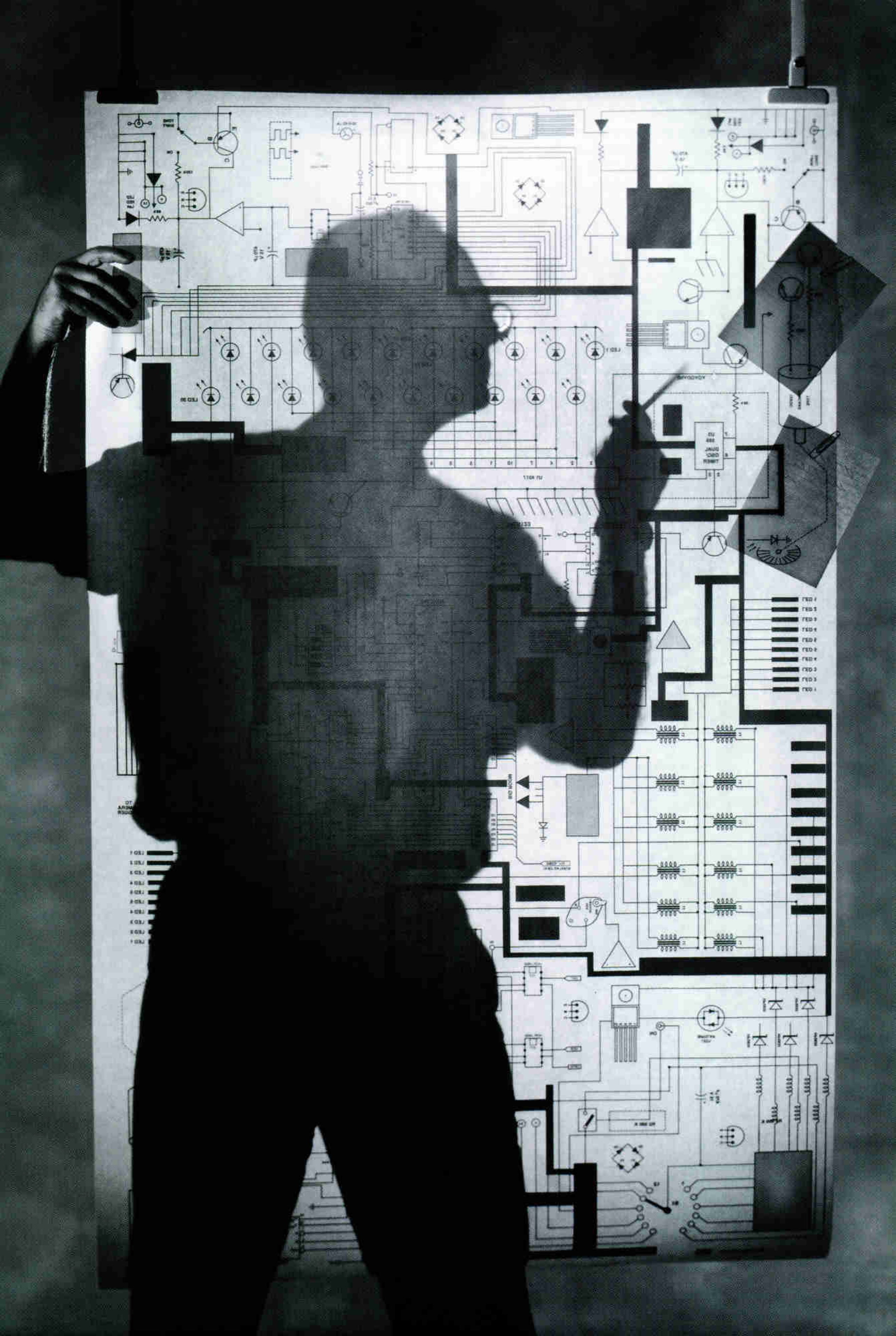
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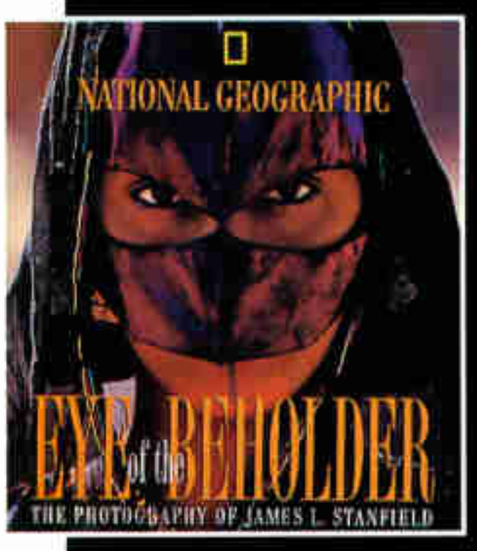
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Something to Behold

What do you do when you've seen it all—and taken pictures of most of it? James L. Stanfield and colleagues put together a book, *Eye of the Beholder,* to tell the story of his more than 30 years as a National Geographic Society photographer. Now Stanfield's work is being specially featured at the prestigious Visa Pour l'Image photojournalism festival in Perpignan, France. The festival runs from August 29 through September 6; exhibitions (above) are open to the public until September 13.





JOEL SARTORE



JIM RICHARDSON

What Goes Around Comes Around

Sometimes we even help our members carve out a living. Sculptor Bruce White of Kinsley, Kansas (above), and his twin, Brent, of Poulsbo, Washington, use GEOGRAPHIC photos to model carousel animals. Their elephants, gorillas, and salmon now spin in cities from Boise, Idaho, to Seoul, Korea. Bruce insists on accuracy. "Carving this howling wolf, I had no idea about the teeth. My dog wouldn't keep his mouth open, so I looked in a GEOGRAPHIC and found just the wolf picture I needed."

Giving Kids the World

We're going back to school. To celebrate the tenth anniversary of our Education Foundation, the Society is sending an up-to-date, two-sided, four-by-six-foot laminated map to every public and private school in the United States. Some 112,000 maps will be distributed with the help of our four Millennium Partners: the American Plastics Council, Eastman Kodak Company, State Farm Insurance Companies, and Subaru of America.



TEXT BY MAGGIE ZACKOWITZ

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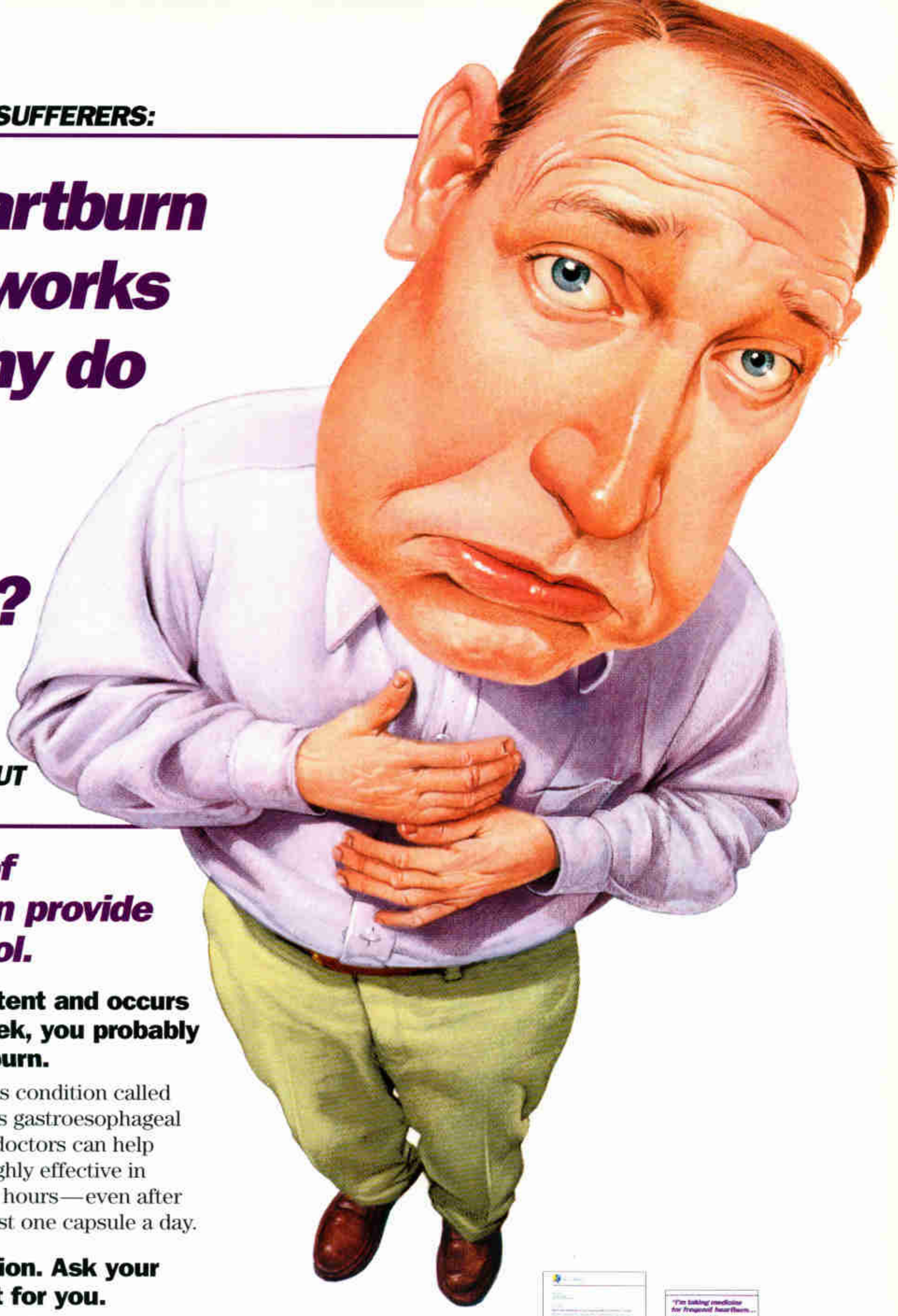
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You will receive FREE: a brochure about frequent heartburn, acid reflux disease, and PRILOSEC; plus, a personal heartburn diary, and a symptom questionnaire to help your doctor help you.

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Please read this summary carefully, and then ask your doctor about PRILOSEC. No advertisement can provide all the information needed to prescribe a drug. This advertisement does not take the place of careful discussions with your doctor. *Only your doctor* has the training to weigh the risks and benefits of a prescription drug for you.

PRILOSEC® (OMEPRAZOLE)*
Delayed-Release Capsules
BRIEF SUMMARY

CLINICAL PHARMACOLOGY ***Pharmacokinetics and Metabolism:*** **Omeprazole –** In pharmacokinetic studies of single 20 mg omeprazole doses, an increase in AUC of approximately four-fold was noted in Asian subjects compared to Caucasians. Dose adjustment, particularly where maintenance of healing of erosive esophagitis is indicated, for the hepatically impaired and Asian subjects should be considered.

INDICATIONS AND USAGE ***Duodenal Ulcer:*** PRILOSEC is indicated for short-term treatment of active duodenal ulcer. Most patients heal within 4 weeks. Some patients may require an additional 4 weeks of therapy. PRILOSEC, in combination with clarithromycin, is also indicated for treatment of patients with *H. pylori* infection and active duodenal ulcer to eradicate *H. pylori*. Eradication of *H. pylori* has been shown to reduce the risk of duodenal ulcer recurrence. In patients who fail therapy, susceptibility testing should be done. If resistance to clarithromycin is demonstrated or susceptibility testing is not possible, alternative antimicrobial therapy should be instituted. (See the clarithromycin package insert, MICROBIOLOGY section.) ***Gastric Ulcer:*** PRILOSEC is indicated for short-term treatment (4-8 weeks) of active benign gastric ulcer. ***Treatment of Gastroesophageal Reflux Disease (GERD):*** **Symptomatic GERD –** PRILOSEC is indicated for the treatment of heartburn and other symptoms associated with GERD. **Erosive Esophagitis –** PRILOSEC is indicated for the short-term treatment (4-8 weeks) of erosive esophagitis which has been diagnosed by endoscopy. The efficacy of PRILOSEC used for longer than 8 weeks in these patients has not been established. In the rare instance of a patient not responding to 8 weeks of treatment, it may be helpful to give up to an additional 4 weeks of treatment. If there is recurrence of erosive esophagitis or GERD symptoms (e.g. heartburn), additional 4-8 week courses of omeprazole may be considered. ***Maintenance of Healing of Erosive Esophagitis:*** PRILOSEC is indicated to maintain healing of erosive esophagitis. Controlled studies do not extend beyond 12 months. ***Pathological Hypersecretory Conditions:*** PRILOSEC is indicated for the long-term treatment of pathological hypersecretory conditions (e.g., Zollinger-Ellison syndrome, multiple endocrine adenomas and systemic mastocytosis).

CONTRAINDICATIONS ***Omeprazole:*** PRILOSEC Delayed-Release Capsules are contraindicated in patients with known hypersensitivity to any component of the formulation. ***Clarithromycin:*** Clarithromycin is contraindicated in patients with a known hypersensitivity to any macrolide antibiotic. Concomitant administration of clarithromycin with cisapride, pimozide, or terfenadine is contraindicated. There have been post-marketing reports of drug interactions when clarithromycin and/or erythromycin are co-administered with cisapride, pimozide, or terfenadine resulting in cardiac arrhythmias (QT prolongation, ventricular tachycardia, ventricular fibrillation, and torsades de pointes) most likely due to inhibition of hepatic metabolism of these drugs by erythromycin and clarithromycin. Fatalities have been reported. (Please refer to full prescribing information for clarithromycin before prescribing.)

WARNING: ***Clarithromycin:*** **CLARITHROMYCIN SHOULD NOT BE USED IN PREGNANT WOMEN EXCEPT IN CLINICAL CIRCUMSTANCES WHERE NO ALTERNATIVE THERAPY IS APPROPRIATE. IF PREGNANCY OCCURS WHILE TAKING CLARITHROMYCIN, THE PATIENT SHOULD BE APPRISED OF THE POTENTIAL HAZARD TO THE FETUS. (See WARNINGS in prescribing information for clarithromycin.)**

PRECAUTIONS ***General:*** Symptomatic response to therapy with omeprazole does not preclude the presence of gastric malignancy. Atrophic gastritis has been noted occasionally in gastric corpus biopsies from patients treated long-term with omeprazole. ***Information for Patients:*** PRILOSEC Delayed-Release Capsules should be taken before eating. Patients should be cautioned that the PRILOSEC Delayed-Release Capsule should not be opened, chewed or crushed, and should be swallowed whole. ***Drug Interactions:*** **Other –** Omeprazole can prolong the elimination of diazepam, warfarin and phenytoin, drugs that are metabolized by oxidation in the liver. Although in normal subjects no interaction with theophylline or propranolol was found, there have been clinical reports of interaction with other drugs metabolized via the cytochrome P-450 system (e.g., cyclosporine, disulfiram, benzodiazepines). Patients should be monitored to determine if it is necessary to adjust the dosage of these drugs when taken concomitantly with PRILOSEC. Because of its profound and long lasting inhibition of gastric acid secretion, it is theoretically possible that omeprazole may interfere with absorption of drugs where gastric pH is an important determinant of their bioavailability (e.g., ketoconazole, ampicillin esters, and iron salts). In the clinical trials, antacids were used concomitantly with the administration of PRILOSEC. **Combination Therapy with Clarithromycin –** Co-administration of omeprazole and clarithromycin may result in increases in plasma levels of omeprazole, clarithromycin, and 14-hydroxy-clarithromycin. (See CLINICAL PHARMACOLOGY, *Pharmacokinetics: Combination Therapy with Clarithromycin* in full Prescribing Information.) Concomitant administration of clarithromycin with cisapride, pimozide, or terfenadine is contraindicated. There have been reports of an interaction between erythromycin and astemizole resulting in QT prolongation and torsades de pointes. Concomitant administration of erythromycin and astemizole is contraindicated. Because clarithromycin is also metabolized by cytochrome P450, concomitant administration of clarithromycin with astemizole is not recommended. (See also CONTRAINDICATIONS, *Clarithromycin*, above. Please refer to full prescribing information for clarithromycin before prescribing.) ***Carcinogenesis, Mutagenesis, Impairment of Fertility:*** In two 24-month carcinogenicity studies in rats, omeprazole at daily doses of 1.7, 3.4, 13.8, 44.0 and 140.8 mg/kg/day (approximately 4 to 352 times the human dose, based on a patient weight of 50 kg and a human dose of 20 mg) produced gastric ECL cell carcinoids in a dose-related manner in both male and female rats; the incidence of this effect was markedly higher in female rats, which had higher blood levels of omeprazole. Gastric carcinoids seldom occur in the untreated rat. In addition, ECL cell hyperplasia was present in all treated groups of both sexes. In one of these studies, female rats were treated with 13.8 mg/kg/day omeprazole (approximately 35 times the human dose) for 1 year, then followed for an additional year without the drug. No carcinoids were seen in these rats. An increased incidence of treatment-related ECL cell hyperplasia was observed at the end of 1 year (94% treated vs 10% controls). By the second year the difference between treated and control rats was much smaller (46% vs 26%) but still showed more hyperplasia in the treated group. An unusual primary malignant tumor in the stomach was seen in one rat (2%). No similar tumor was seen in male or female rats treated for 2 years. For this strain of rat no similar tumor has been noted historically, but a finding involving only one tumor is difficult to interpret. A 78-week mouse carcinogenicity study of omeprazole did not show increased tumor occurrence, but the study was not conclusive. Omeprazole was not mutagenic in an *in vitro* Ames *Salmonella typhimurium* assay, an *in vitro* mouse lymphoma cell assay and an *in vivo* rat liver DNA damage assay. A mouse micronucleus test at 625 and 6250 times the human dose gave a borderline result, as did an *in vivo* bone marrow chromosome aberration test. A second mouse micronucleus study at 2000 times the human dose, but with different (suboptimal) sampling times, was negative. ***Pregnancy:*** **Omeprazole: Pregnancy Category C –** In rabbits, omeprazole in a dose range of 6.9 to 69.1 mg/kg/day (approximately 17 to 172 times the human dose) produced dose-related increases in embryo-lethality, fetal resorptions and pregnancy disruptions. In rats, dose-related embryo/fetal toxicity and postnatal developmental toxicity were observed in offspring resulting from parents treated with omeprazole 13.8 to 138.0 mg/kg/day (approximately 35 to 345 times the human dose). There are no adequate or well-controlled studies in pregnant women. Sporadic reports have been received of congenital abnormalities occurring in infants born to women who have received omeprazole during pregnancy. Omeprazole should be used during pregnancy only if the potential benefit justifies the potential risk to the fetus. **Clarithromycin: Pregnancy Category C –** See WARNING (above) and full prescribing information for clarithromycin before using in pregnant women. ***Nursing Mothers:*** It is not known whether omeprazole is excreted in human milk. In rats, omeprazole administration during late gestation and lactation at doses of 13.8 to 138 mg/kg/day (35 to 345 times the human dose) resulted in decreased weight gain in pups. Because many drugs are excreted in human milk, because of the potential for serious adverse reactions in nursing infants from omeprazole, and because of the potential for tumorigenicity shown for omeprazole in rat carcinogenicity studies, a decision should be made whether to discontinue nursing or discontinue the drug, taking into account the importance of the drug to the mother. ***Pediatric Use:*** Safety and effectiveness in children have not been established.

ADVERSE REACTIONS: In the U.S. clinical trial population of 465 patients (including duodenal ulcer, Zollinger-Ellison syndrome and resistant ulcer patients), the following adverse experiences were reported to occur in 1% or more of patients on therapy with PRILOSEC® (omeprazole). Numbers in parentheses indicate percentages of the adverse experiences considered by investigators as possibly, probably, or definitely related to the drug.

	Omeprazole (n=465)	Placebo (n=64)	Ranitidine (n=195)
Headache	6.9 (2.4)	6.3	7.7 (2.6)
Diarrhea	3.0 (1.9)	3.1 (1.6)	2.1 (0.5)
Abdominal Pain	2.4 (0.4)	3.1	2.1
Nausea	2.2 (0.9)	3.1	4.1 (0.5)
URI	1.9	1.6	2.6
Dizziness	1.5 (0.6)	0.0	2.6 (1.0)
Vomiting	1.5 (0.4)	4.7	1.5 (0.5)
Rash	1.5 (1.1)	0.0	0.0
Constipation	1.1 (0.9)	0.0	0.0
Cough	1.1	0.0	1.5
Asthenia	1.1 (0.2)	1.6 (1.6)	1.5 (1.0)
Back Pain	1.1	0.0	0.5

The following adverse reactions which occurred in 1% or more of omeprazole-treated patients have been reported in international double-blind, and open-label, clinical trials in which 2,631 patients and subjects received omeprazole.

Incidence of Adverse Experiences ≥ 1% Causal Relationship not Assessed

		Omeprazole (n=2631)	Placebo (n=120)
Body as a Whole, site unspecified	Abdominal pain	5.2	3.3
	Asthenia	1.3	0.8
Digestive System	Constipation	1.5	0.8
	Diarrhea	3.7	2.5
	Flatulence	2.7	5.8
	Nausea	4.0	6.7
	Vomiting	3.2	10.0
	Acid regurgitation	1.9	3.3
Nervous System/Psychiatric	Headache	2.9	2.5

Additional adverse experiences occurring in <1% of patients or subjects in domestic and/or international trials, or occurring since the drug was marketed, are shown below within each body system. In many instances, the relationship to PRILOSEC was unclear. *Body As a Whole:* Fever, pain, fatigue, malaise, abdominal swelling. *Cardiovascular:* Chest pain or angina, tachycardia, bradycardia, palpitation, elevated blood pressure, peripheral edema. *Gastrointestinal:* Pancreatitis (some fatal), anorexia, irritable colon, flatulence, fecal discoloration, esophageal candidiasis, mucosal atrophy of the tongue, dry mouth. During treatment with omeprazole, gastric fundic gland polyps have been noted rarely. These polyps are benign and appear to be reversible when treatment is discontinued. Gastro-duodenal carcinoids have been reported in patients with ZE syndrome on long-term treatment with PRILOSEC. This finding is believed to be a manifestation of the underlying condition, which is known to be associated with such tumors. *Hepatic:* Mild and, rarely, marked elevations of liver function tests [ALT (SGPT), AST (SGOT), γ-glutamyl transpeptidase, alkaline phosphatase, and bilirubin (jaundice)]. In rare instances, overt liver disease has occurred, including hepatocellular, cholestatic, or mixed hepatitis, liver necrosis (some fatal), hepatic failure (some fatal), and hepatic encephalopathy. *Metabolic/Nutritional:* Hyponatremia, hypoglycemia, weight gain. *Musculoskeletal:* Muscle cramps, myalgia, muscle weakness, joint pain, leg pain. *Nervous System/Psychiatric:* Psychic disturbances including depression, aggression, hallucinations, confusion, insomnia, nervousness, tremors, apathy, somnolence, anxiety, dream abnormalities; vertigo; paresthesia; hemifacial dysesthesia. *Respiratory:* Epistaxis, pharyngeal pain. *Skin:* Rash and, very rarely, cases of severe generalized skin reactions including toxic epidermal necrolysis (TEN; some fatal), Stevens-Johnson syndrome, and erythema multiforme (some severe); skin inflammation, urticaria, angioedema, pruritus, alopecia, dry skin, hyperhidrosis. *Special Senses:* Tinnitus, taste perversion. *Urogenital:* Interstitial nephritis (some with positive rechallenge), urinary tract infection, microscopic pyuria, urinary frequency, elevated serum creatinine, proteinuria, hematuria, glycosuria, testicular pain, gynecomastia. *Hematologic:* Rare instances of pancytopenia, agranulocytosis (some fatal), thrombocytopenia, neutropenia, anemia, leucocytosis, and hemolytic anemia have been reported. ***Combination Therapy with Clarithromycin:*** In clinical trials using combination therapy with PRILOSEC and clarithromycin, no adverse experiences peculiar to this drug combination have been observed. Adverse experiences that have occurred have been limited to those that have been previously reported with omeprazole or clarithromycin. Adverse experiences observed in controlled clinical trials using combination therapy with PRILOSEC and clarithromycin (n=346) which differed from those previously described for omeprazole alone were: Taste perversion (15%), tongue discoloration (2%), rhinitis (2%), pharyngitis (1%), and flu syndrome (1%). For more information on clarithromycin, refer to the clarithromycin package insert, ADVERSE REACTIONS section.

OVERDOSAGE: Rare reports have been received of overdosage with omeprazole. Doses ranged from 320 mg to 900 mg (16-45 times the usual recommended clinical dose). Manifestations were variable, but included confusion, drowsiness, blurred vision, tachycardia, nausea, diaphoresis, flushing, headache, and dry mouth. Symptoms were transient, and no serious clinical outcome has been reported. No specific antidote for omeprazole overdosage is known. Omeprazole is extensively protein bound and is, therefore, not readily dialyzable. In the event of overdosage, treatment should be symptomatic and supportive.

DOSAGE AND ADMINISTRATION ***Duodenal Ulcer:*** Short-Term Treatment of Active Duodenal Ulcer: The recommended adult oral dose of PRILOSEC is 20 mg once daily. Most patients heal within 4 weeks. Some patients may require an additional 4 weeks of therapy. (See INDICATIONS AND USAGE.)

Reduction of the Risk of Duodenal Ulcer Recurrence: Combination Therapy with Clarithromycin

Days 1-14:	Days 15-28:
PRILOSEC 40 mg q.d. (in the morning) plus clarithromycin 500 mg t.i.d.	PRILOSEC 20 mg q.d.

Please refer to clarithromycin full prescribing information for CONTRAINDICATIONS and WARNING, and for information regarding dosing in elderly and renally impaired patients (PRECAUTIONS: *General*, PRECAUTIONS: *Geriatric Use* and PRECAUTIONS: *Drug Interactions*). ***Gastric Ulcer:*** The recommended adult oral dose is 40 mg once a day for 4 to 8 weeks. (See INDICATIONS AND USAGE, *Gastric Ulcer.*) ***Gastroesophageal Reflux Disease (GERD):*** The recommended adult oral dose for the treatment of patients with symptomatic GERD and no esophageal lesions is 20 mg daily for up to 4 weeks. The recommended adult oral dose for the treatment of patients with erosive esophagitis and accompanying symptoms due to GERD is 20 mg daily for 4 to 8 weeks. (See INDICATIONS AND USAGE.) ***Maintenance of Healing of Erosive Esophagitis:*** The recommended adult oral dose is 20 mg daily. ***Pathological Hypersecretory Conditions:*** The dosage of PRILOSEC in patients with pathological hypersecretory conditions varies with the individual patient. The recommended adult oral starting dose is 60 mg once a day. Doses should be adjusted to individual patient needs and should continue for as long as clinically indicated. Doses up to 120 mg t.i.d. have been administered. Daily dosages of greater than 80 mg should be administered in divided doses. No dosage adjustment is necessary for patients with renal impairment, hepatic dysfunction or for the elderly.

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February 1997 *PRC-44/3/97* PRI24

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Forum

As part of our millennium series the May 1998 issue highlighted the changing Earth. Readers had definite opinions about the climate article, weighing in on both sides of the global-warming debate. The gray wolf story also aroused strong feelings about a creature both loved and despised.

Climate Puzzle

I have been distressed by stories about global warming that totally blame human-caused emissions without even the mention of natural phenomena. Your climate story is one of the few that informs the public that whatever humans are doing is superimposed on stupendous natural forces that have caused drastic and often sudden changes in the past.

M. A. KAUFMAN
Spokane, Washington

Discussion of problems relating to the long-term effect of human activity on the environment is important, but your article is written in a manner that gives the impression that global warming is established fact, which it is not. It is still a matter of controversy among those in the scientific community.

DAVID CLARK
Eden Prairie, Minnesota

I am disappointed in the wishy-washy view you present about the human impact on global climate. I am concerned your article will only encourage those who say "we need to do more research" rather than make painful economic choices. Come on, guys, it's our planet we are talking about here!

RICHARD FIDLER
Traverse City, Michigan

The Intergovernmental Panel on Climate Change stated that there exist "uncertainties in key factors" in determining the influence of human activities on global climate (page 46). One of these key factors is the volume of meteorological data on record. The 150 years of global surface temperatures that have been directly measured represent a mere blink in the four-billion-year era of life on Earth. To suggest that a long-term trend be extrapolated from these limited data is tantamount to deciding in which 15-year-old mutual fund to invest—after tracking the latest trend for 18 seconds.

PAUL E. BURNHAM
Kaysville, Utah

In the caption for the graph titled "Steamy Summers for Southeast U.S." (page 69) you state that a temperature increase from about 83°F to 100°F is a 20 percent increase. This is incorrect. If a temperature change is to be expressed as a percentage change, a scale such as Kelvin—for which zero is at the lowest temperature possible—should be used. In this case the temperature change is from 302K to 311K, an increase of 3 percent.

ANTON SAWATZKY
Pinawa, Manitoba

We regret the error and also our use of an inaccurate label in the illustration. The graph does not represent temperature alone, as indicated, but rather heat index. This is a measure of how warm it feels, based on a combination of humidity and temperature.

I disagree when you say that higher concentrations of carbon dioxide might help farmers (page 47). Some plants respond to elevated CO_2, while others are less affected. Rice, for example, will produce more tissue, but it will have a lower nutrient concentration. This makes animals consume more and emit more methane into the atmosphere, thus enhancing the greenhouse effect.

SURAJE DESSAI
Norwich, England

Physical World Map

The "Earth in Flux" map showing the Earth over millions of years makes me more aware of the fact that the map of our planet is merely temporary and that it will change beyond recognition in the future. What a fascinating exercise it is to imagine what this map might look like in another 50 million years. I visualize the sea level 20 meters higher, Antarctica disintegrated, the entire west coast of North and South America blown away.

RAYMOND STERN
Ottawa, Ontario

As a single source showing continental evolution, the environment, and the development of life on this planet, the map is the best I have come across. But I would like to have seen the relative composition of the atmosphere over those millions of years.

DON WOLFF
Los Lunas, New Mexico

I was pleased to see the picture of the tree-ring specimen from our Tree-Ring Laboratory. Unfortunately, the text is incorrect. The little ice age is associated by some with a decrease in sunspots, not an increase. Such an association is not universally accepted, however, and the concept of a global little ice age itself is disputed.

GORDON C. JACOBY
Lamont-Doherty Earth Observatory
Columbia University
Palisades, New York

When I entered the Technical University of Budapest in 1942, our geology professor taught us that Wegener's 1915 tectonic plate theory was the most advanced but still not proved. Your maps, based on satellite measurements and mapping and core samples, fully convince us on the matter.

MIKLOS MERENYI
Budapest, Hungary

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Cascadia

For far too long, residents of the Pacific Northwest and British Columbia have been complacent when it comes to earthquakes and volcanoes. Preparations are being made, but more must be done. Sooner or later the big one will target this area. It's past due and just a matter of time.

FRANK FLEMING
Milwaukie, Oregon

The text on page 19 of the article may cause confusion. It discusses the motion of coastal sites, but the directions of ongoing crustal motion are wrong. Based on the results of continuous GPS monitoring over the past several years, it is clear that Neah Bay on the northwestern tip of the Olympic Peninsula is moving east-northeast, not northwest, and the Canadian site Ucluelet is moving northeast, not west.

HERB DRAGERT
Pacific Geoscience Centre
Sidney, British Columbia

Walking barefoot on coals (page 14) is no magical mystery. One explanation is that fear causes people to sweat. People who walk across burning embers do so with wet feet. A vapor barrier of moist air covers the soles of the feet. But it lasts only a short time. That's why the author was advised to take 12 quick steps and then get out of harm's way.

NEIL GARRISON
Yukon, Oklahoma

I was astounded to discover on the map on pages 20-22 that Second Beach had been relocated to the Strait of Juan de Fuca from a point about five miles south of Rialto Beach on the Pacific coast, where it was just a month ago when I visited.

FRED OAKES
Chicago, Illinois

Gray Wolf

We Americans construct nature zones and place wildlife inside them, where it is convenient for us. We then build farms and cities right up to the borders and expect the wildlife to obey the boundaries. I would like to remind the ranchers who want to kill wolves that attack their livestock that they are violating the wolf's habitat, not the other way around.

BRIAN ITAMI
Northridge, California

Why are we so intent on reintroducing wolves to new locations with no concern for the resulting trauma to these animals? Leave the poor animals in their existing domain and stop trying to correct past mistakes by making more mistakes.

WILLIAM JANSSEN
Nepean, Ontario

While I sympathize with the girl in Montana who lost her pet calf, Minnie (page 94), I sympathize even more with the local pack's alpha male, who apparently was shot for the crime. Most cattle on ranches are raised for slaughter so humans can consume their meat. I suspect even Minnie would have

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found herself on the block someday. I doubt she would have cared at that moment whether her killer was wolf or man.

N. J. NIDIFFER
Graniteville, South Carolina

There is growing evidence that wolves are attempting to recolonize the Northeast from neighboring populations in Canada. With tens of thousands of square miles of potential wolf habitat and abundant prey (Maine alone has an estimated 30,000 moose), the area south of the St. Lawrence River may prove to be the site of the next great wolf success story.

JOHN GLOWA
The Maine Wolf Coalition, Inc.
South China, Maine

One of the dangers of creating environmental celebrities, such as wolves or grizzlies, is that people will rush to view them. As ecotourism transforms into ecomigration, much of the room in which the wolves now roam will be lost.

GALE HEIDE
Belgrade, Montana

Prince Edward Island

I am a native who moved away in the early 1960s. It is only since I returned in August of last year that I have truly come to appreciate what we have here in our little province. When we purchased our home, we asked for the keys. The former owner looked at us rather oddly and then began to look around to see if there was one. He had never used a key.

LINDA FREITAG
Summerside, Prince Edward Island

Whitbread Race

The incredible run made by *Silk Cut* of 449.1 miles in 24 hours is said to have been "the most ever by a monohull sailboat in one day" (page 133). There are a few accounts of clipper ships 150 years earlier making even faster runs. Between December 11 and 12, 1854, the 2,447-ton Champion of the Seas made a "noon to noon" run of 465 nautical miles en route to Melbourne in a stretch of sea east of the Kerguelens. Not bad for a vessel of more than a hundred times the tonnage of a Whitbread sloop.

ROBERT LATZMAYER
Seattle, Washington

Letters for Forum should be sent to National Geographic Magazine, Box 98198, Washington, D.C. 20090-8198, or by fax to 202-828-5460, or via the Internet to ngsforum@nationalgeographic.com. Include name, address, and daytime telephone. Letters may be edited for clarity and space.

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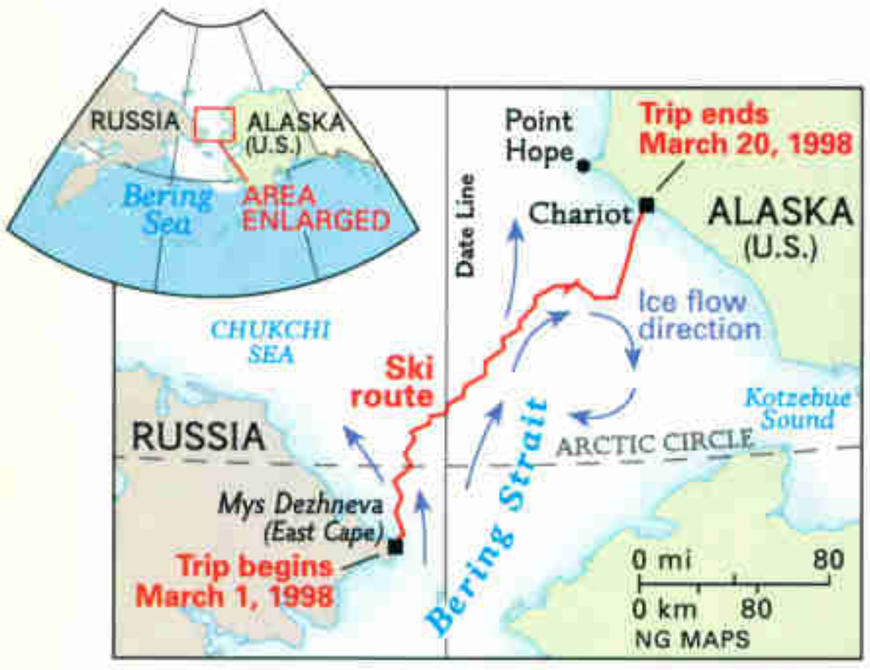
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NATIONAL GEOGRAPHIC
Geographica

Crossing the Bering Strait—on Skis

About 55 miles separates Russia from Alaska at the narrowest point. But when veteran Russian Arctic adventurer Dmitry Shparo, 56, and his son Matvey, 22, made a historic first crossing of the Bering Strait on foot in March, they ended up traveling some 180 miles because the flow of the ice carried them northward.

They conquered choppy ice and snow, skirted open water, and avoided the occasional polar bear. "Never did I see a place with so bad an ice situation," says the elder Shparo. This was his fifth attempt to cross the strait.



Matvey hauled the sled carrying supplies (upper right). His father bore a backpack that initially weighed a hundred pounds; fierce winds often turned it into a sail. On their best days they skied ten miles; on their worst, less than two, spending nights in their tent (lower right). The trip took 21 days, far longer than expected, forcing them to halve their daily 5,000-calorie ration partway through. Dmitry lost 22 pounds. It was worth it, he believes. "This trip was my happiest because I was with my son, my good friend," he says.





BOTH BY DMITRY SHPARO



MARC MORITSCH, NGS IMAGE COLLECTION

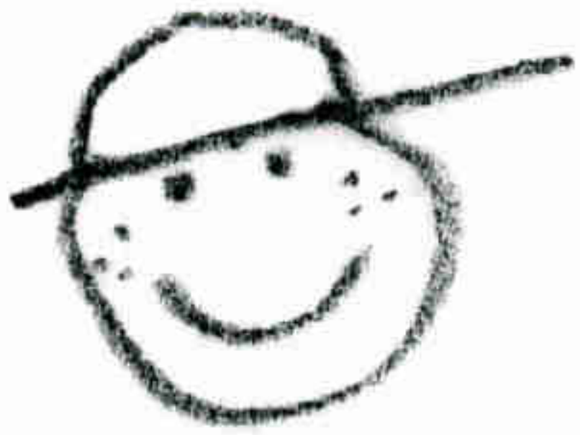
A Siberian Tiger Trail in China

Good news for Siberian tigers: Last winter the first international survey of the endangered cats in northeast China's Jilin Province found tracks and droppings indicating that four to six tigers were present close to the Russian border. Large forested tracts—ideal tiger habitat—exist in the region. But tiger numbers are held down by the low density of prey such as deer and boar, says Dale Miquelle of the Hornocker Wildlife Institute (GEOGRAPHIC, February 1997), a leader of the UN-supported survey. The team has urged provincial officials to create a plan to establish a breeding tiger population in Jilin.



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CAROLINA SALGUERO

All the World Comes to Queens

Welcome to Elmhurst 11373, the most ethnically diverse zip code in the United States. Statisticians say 12,920 legal immigrants from 123 nations settled in this 2.2-square-mile chunk of Queens in New York City from 1990 to 1994.

As waves of immigrants have moved to New York in the past decade, many have joined family and friends in ethnic enclaves. But no single nationality dominates in Elmhurst. The largest group of settlers came from China, followed by arrivals from Colombia, the Philippines, India, Korea, the Dominican Republic, Ecuador, Bangladesh, Peru, and Pakistan. Nations as different as Iran and Guatemala, Ghana and Egypt add to the mix.

"There has been relatively little conflict among the different groups," says Roger Sanjek, a Queens College anthropologist who studies the working-class neighborhood, which is well linked by subway lines to jobs elsewhere. It's much as it was when families of European immigrants predominated, he says: "The colors of the faces and the languages are more diverse, but Elmhurst has not come apart."



BOTH BY DONALD FREY

Clues to a Mystery Guest

Laden with 1,500 wine-filled clay jars—some with merchants' names scratched on them—a wooden ship 60 to 70 feet long sank in 85 feet of water off Turkey's southwestern coast nearly 1,200 years ago. Though the crew of eight apparently carried only the usual sort of sailor's possessions, such as tools and wooden cooking bowls, "a person of means" may also have been aboard, says Fred Hocker of the Institute of Nautical Archaeology at Texas A&M University, who is leading the excavation of the wreck. The evidence: a hand-blown glass flask and a pair of fine glass goblets; one has been partly reassembled (left).

The home port and destination of the ship are unknown, but the clay jars resemble pottery from that era found in kilns in Crimea on the Black Sea.

TEXT BY BORIS WEINTRAUB





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Please see next page for additional important information.

*These findings were based on a sales comparison of loratadine (US dollars) with other leading antihistamines. IMS International Prescription Audit. (September 1994 to April 1998).

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BRIEF SUMMARY (For full Prescribing Information, see package insert.)

INDICATIONS AND USAGE: CLARITIN is indicated for the relief of nasal and non-nasal symptoms of seasonal allergic rhinitis and for the treatment of chronic idiopathic urticaria in patients 6 years of age or older.

CONTRAINDICATIONS: CLARITIN is contraindicated in patients who are hypersensitive to this medication or to any of its ingredients.

PRECAUTIONS: General: Patients with liver impairment or renal insufficiency (GFR < 30 mL/min) should be given a lower initial dose (10 mg every other day). (See **CLINICAL PHARMACOLOGY: Special Populations.)**

Drug Interactions: Loratadine (10 mg once daily) has been coadministered with therapeutic doses of erythromycin, cimetidine, and ketoconazole in controlled clinical pharmacology studies in adult volunteers. Although increased plasma concentrations (AUC 0-24 hrs) of loratadine and/or descarboethoxyloratadine were observed following coadministration of loratadine with each of these drugs in normal volunteers (n = 24 in each study), there were no clinically relevant changes in the safety profile of loratadine, as assessed by electrocardiographic parameters, clinical laboratory tests, vital signs, and adverse events. There were no significant effects on QT_c intervals, and no reports of sedation or syncope. No effects on plasma concentrations of cimetidine or ketoconazole were observed. Plasma concentrations (AUC 0-24 hrs) of erythromycin decreased 15% with coadministration of loratadine relative to that observed with erythromycin alone. The clinical relevance of this difference is unknown. These above findings are summarized in the following table:

Effects on Plasma Concentrations (AUC 0-24 hrs) of Loratadine and Descarboethoxyloratadine After 10 Days of Coadministration (Loratadine 10 mg) in Normal Volunteers

	Loratadine	Descarboethoxyloratadine
Erythromycin (500 mg Q8h)	+ 40%	+46%
Cimetidine (300 mg QID)	+103%	+ 6%
Ketoconazole (200 mg Q12h)	+307%	+73%

There does not appear to be an increase in adverse events in subjects who received oral contraceptives and loratadine.

Carcinogenesis, Mutagenesis, and Impairment of Fertility: In an 18-month carcinogenicity study in mice and a 2-year study in rats, loratadine was administered in the diet at doses up to 40 mg/kg (mice) and 25 mg/kg (rats). In the carcinogenicity studies, pharmacokinetic assessments were carried out to determine animal exposure to the drug. AUC data demonstrated that the exposure of mice given 40 mg/kg of loratadine was 3.6 (loratadine) and 18 (descarboethoxyloratadine) times higher than in humans given the maximum recommended daily oral dose. Exposure of rats given 25 mg/kg of loratadine was 28 (loratadine) and 67 (descarboethoxyloratadine) times higher than in humans given the maximum recommended daily oral dose. Male mice given 40 mg/kg had a significantly higher incidence of hepatocellular tumors (combined adenomas and carcinomas) than concurrent controls. In rats, a significantly higher incidence of hepatocellular tumors (combined adenomas and carcinomas) was observed in males given 10 mg/kg and males and females given 25 mg/kg. The clinical significance of these findings during long-term use of CLARITIN is not known.

In mutagenicity studies, there was no evidence of mutagenic potential in reverse (Ames) or forward point mutation (CHO-HGPRT) assays, or in the assay for DNA damage (rat primary hepatocyte unscheduled DNA assay) or in two assays for chromosomal aberrations (human peripheral blood lymphocyte clastogenesis assay and the mouse bone marrow erythrocyte micronucleus assay). In the mouse lymphoma assay, a positive finding occurred in the non-activated but not the activated phase of the study.

Decreased fertility in male rats, shown by lower female conception rates, occurred at an oral dose of 64 mg/kg (approximately 50 times the maximum recommended human daily oral dose on a mg/m^2 basis) and was reversible with cessation of dosing. Loratadine had no effect on male or female fertility or reproduction in the rat at an oral dose of approximately 24 mg/kg (approximately 20 times the maximum recommended human daily oral dose on a mg/m^2 basis).

Pregnancy Category B: There was no evidence of animal teratogenicity in studies performed in rats and rabbits at oral doses up to 96 mg/kg (approximately 75 times and 150 times, respectively, the maximum recommended human daily oral dose on a mg/m^2 basis). There are, however, no adequate and well-controlled studies in pregnant women. Because animal reproduction studies are not always predictive of human response, CLARITIN should be used during pregnancy only if clearly needed.

Nursing Mothers: Loratadine and its metabolite, descarboethoxyloratadine, pass easily into breast milk and achieve concentrations that are equivalent to plasma levels with an AUC_{milk}/AUC_{plasma} ratio of 1.17 and 0.85 for loratadine and descarboethoxyloratadine, respectively. Following a single oral dose of 40 mg, a small amount of loratadine and descarboethoxyloratadine was excreted into the breast milk (approximately 0.03% of 40 mg over 48 hours). A decision should be made whether to discontinue nursing or to discontinue the drug, taking into account the importance of the drug to the mother. Caution should be exercised when CLARITIN is administered to a nursing woman.

Pediatric Use: The safety of CLARITIN Syrup at a daily dose of 10 mg has been demonstrated in 188 pediatric patients 6-12 years of age in placebo-controlled 2-week trials. The effectiveness of CLARITIN for the treatment of seasonal allergic rhinitis and chronic idiopathic urticaria in this pediatric age group is based on an extrapolation of the demonstrated efficacy of CLARITIN in adults in these conditions and the likelihood that the disease course, pathophysiology, and the drug's effect are substantially similar to that of the adults. The recommended dose for the pediatric population is based on cross-study comparison of the pharmacokinetics of CLARITIN in adults and pediatric subjects and on the safety profile of loratadine in both adults and pediatric patients at doses equal to or higher than the recommended doses. The safety and effectiveness of CLARITIN in pediatric patients under 6 years of age have not been established.

ADVERSE REACTIONS: CLARITIN Tablets: Approximately 90,000 patients, aged 12 and older, received CLARITIN Tablets 10 mg once daily in controlled and uncontrolled studies. Placebo-controlled clinical trials at the recommended dose of 10 mg once a day varied from 2 weeks' to 6 months' duration. The rate of premature withdrawal from these trials was approximately 2% in both the treated and placebo groups.

REPORTED ADVERSE EVENTS WITH AN INCIDENCE OF MORE THAN 2% IN PLACEBO-CONTROLLED ALLERGIC RHINITIS CLINICAL TRIALS IN PATIENTS 12 YEARS OF AGE AND OLDER
PERCENT OF PATIENTS REPORTING

	LORATADINE 10 mg QD n = 1926	PLACEBO n = 2545	CLEMASTINE 1 mg BID n = 536	TERFENADINE 60 mg BID n = 684
Headache	12	11	8	8
Somnolence	8	6	22	9
Fatigue	4	3	10	2
Dry Mouth	3	2	4	3

Adverse events reported in placebo-controlled chronic idiopathic urticaria trials were similar to those reported in allergic rhinitis studies.

Adverse event rates did not appear to differ significantly based on age, sex, or race, although the number of nonwhite subjects was relatively small.

CLARITIN REDITABS (loratadine rapidly-disintegrating tablets): Approximately 500 patients received CLARITIN REDITABS (loratadine rapidly-disintegrating tablets) in controlled clinical trials of 2 weeks' duration. In these studies, adverse events were similar in type and frequency to those seen with CLARITIN Tablets and placebo.

Administration of CLARITIN REDITABS (loratadine rapidly-disintegrating tablets) did not result in an increased reporting frequency of mouth or tongue irritation.

CLARITIN Syrup: Approximately 300 pediatric patients 6 to 12 years of age received 10 mg loratadine once daily in controlled clinical trials for a period of 8-15 days. Among these, 188 children were treated with 10 mg loratadine syrup once daily in placebo-controlled trials. Adverse events in these pediatric patients were observed to occur with type and frequency similar to those seen in the adult population. The rate of premature discontinuance due to adverse events among pediatric patients receiving loratadine 10 mg daily was less than 1%.

ADVERSE EVENTS OCCURRING WITH A FREQUENCY OF ≥ 2% IN LORATADINE SYRUP-TREATED PATIENTS (6-12 YEARS OLD) IN PLACEBO-CONTROLLED TRIALS, AND MORE FREQUENTLY THAN IN THE PLACEBO GROUP
PERCENT OF PATIENTS REPORTING

	LORATADINE 10 mg QD n = 188	PLACEBO n = 262	CHLORPHENIRAMINE 2-4 mg BID/TID n = 170
Nervousness	4	2	2
Wheezing	4	2	5
Fatigue	3	2	5
Hyperkinesia	3	1	1
Abdominal Pain	2	0	0
Conjunctivitis	2	<1	1
Dysphonia	2	<1	0
Malaise	2	0	1
Upper Respiratory Tract Infection	2	<1	0

In addition to those adverse events reported above (≥ 2%), the following adverse events have been reported in at least one patient in CLARITIN clinical trials in adult and pediatric patients:

Autonomic Nervous System: Altered lacrimation, altered salivation, flushing, hypoesthesia, impotence, increased sweating, thirst.

Body As A Whole: Angioneurotic edema, asthenia, back pain, blurred vision, chest pain, earache, eye pain, fever, leg cramps, malaise, rigors, tinnitus, viral infection, weight gain.

Cardiovascular System: Hypertension, hypotension, palpitations, supraventricular tachyarrhythmias, syncope, tachycardia.

Central and Peripheral Nervous System: Blepharospasm, dizziness, dysphonia, hypertonia, migraine, paresthesia, tremor, vertigo.

Gastrointestinal System: Altered taste, anorexia, constipation, diarrhea, dyspepsia, flatulence, gastritis, hiccup, increased appetite, nausea, stomatitis, toothache, vomiting.

Musculoskeletal System: Arthralgia, myalgia.

Psychiatric: Agitation, amnesia, anxiety, confusion, decreased libido, depression, impaired concentration, insomnia, irritability, paroniria.

Reproductive System: Breast pain, dysmenorrhea, menorrhagia, vaginitis.

Respiratory System: Bronchitis, bronchospasm, coughing, dyspnea, epistaxis, hemoptysis, laryngitis, nasal dryness, pharyngitis, sinusitis, sneezing.

Skin and Appendages: Dermatitis, dry hair, dry skin, photosensitivity reaction, pruritus, purpura, rash, urticaria.

Urinary System: Altered micturition, urinary discoloration, urinary incontinence, urinary retention.

In addition, the following spontaneous adverse events have been reported rarely during the marketing of loratadine: abnormal hepatic function, including jaundice, hepatitis, and hepatic necrosis; alopecia; anaphylaxis; breast enlargement; erythema multiforme; peripheral edema; and seizures.

OVERDOSAGE: In adults, somnolence, tachycardia, and headache have been reported with overdoses greater than 10 mg with the Tablet formulation (40 to 180 mg). Extrapyramidal signs and palpitations have been reported in children with overdoses of greater than 10 mg of CLARITIN Syrup. In the event of overdosage, general symptomatic and supportive measures should be instituted promptly and maintained for as long as necessary.

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NATIONAL GEOGRAPHIC

From the Editor

"RECENT DISCOVERIES IN EGYPT have carried the record of Egyptian civilization back. . . . before the building of the pyramids," we wrote in NATIONAL GEOGRAPHIC's first article about Egypt, in the November 1901 issue. Nearly a century of Society-sponsored research and magazine articles covering the work of Egyptologists from around the world have since then woven an ever richer tapestry of life in ancient Egypt.

From our article describing the opening of King Tutankhamun's tomb to our re-creation of ancient Egyptian baking techniques, the magazine has published some 60 stories about Egypt, its history, and its people. Our Committee for Research and Exploration has helped support more than 80 Egyptian studies and expeditions.

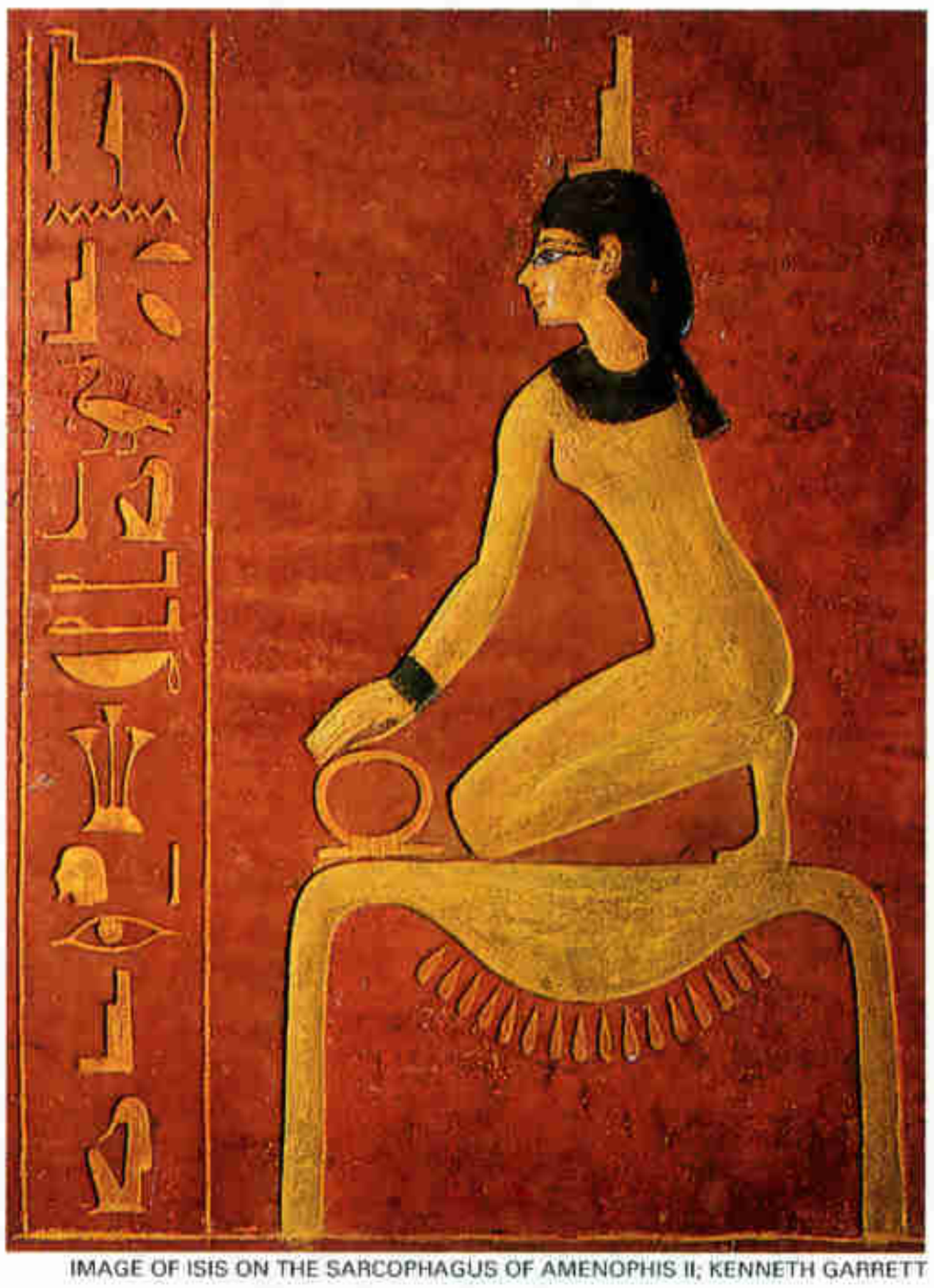


IMAGE OF ISIS ON THE SARCOPHAGUS OF AMENOPHIS II; KENNETH GARRETT

Many of the authors, photographers, and scientists whose work in Egypt has been reported in the GEOGRAPHIC have embarked on adventures worthy of Indiana Jones himself—and none more so than Kent Weeks, professor of Egyptology at the American University in Cairo. In July 1989 he crawled through an obscure tomb entrance and found himself in the largest burial place ever discovered in the Valley of the Kings. His article and Kenneth Garrett's photographs this month—which detail the first excavation of the tomb since British surveyor James Burton located it in 1825—would have been impossible without the generous cooperation of Egypt's Supreme Council of Antiquities. Equally invaluable Egyptian government assistance in 1987 enabled us to lower cameras into a sealed chamber beside the Great Pyramid of Khufu and find a disassembled funerary boat.

The ancient Egyptians left countless reminders of their culture buried in the sand. So long as scientists keep digging up new artifacts and shedding new light on old ones, NATIONAL GEOGRAPHIC will relay their findings to a world that seems perpetually fascinated with the realm of the pharaohs.

Bill Allen

In life they ruled like gods. In death the pharaohs of ancient Egypt's New Kingdom were united with their deities. Decades of excavation in the necropolis (right) near Luxor have turned up treasures like Tutankhamun's gold mask (below), along with insight into the soul of a dead civilization.



VALLEY OF THE KINGS

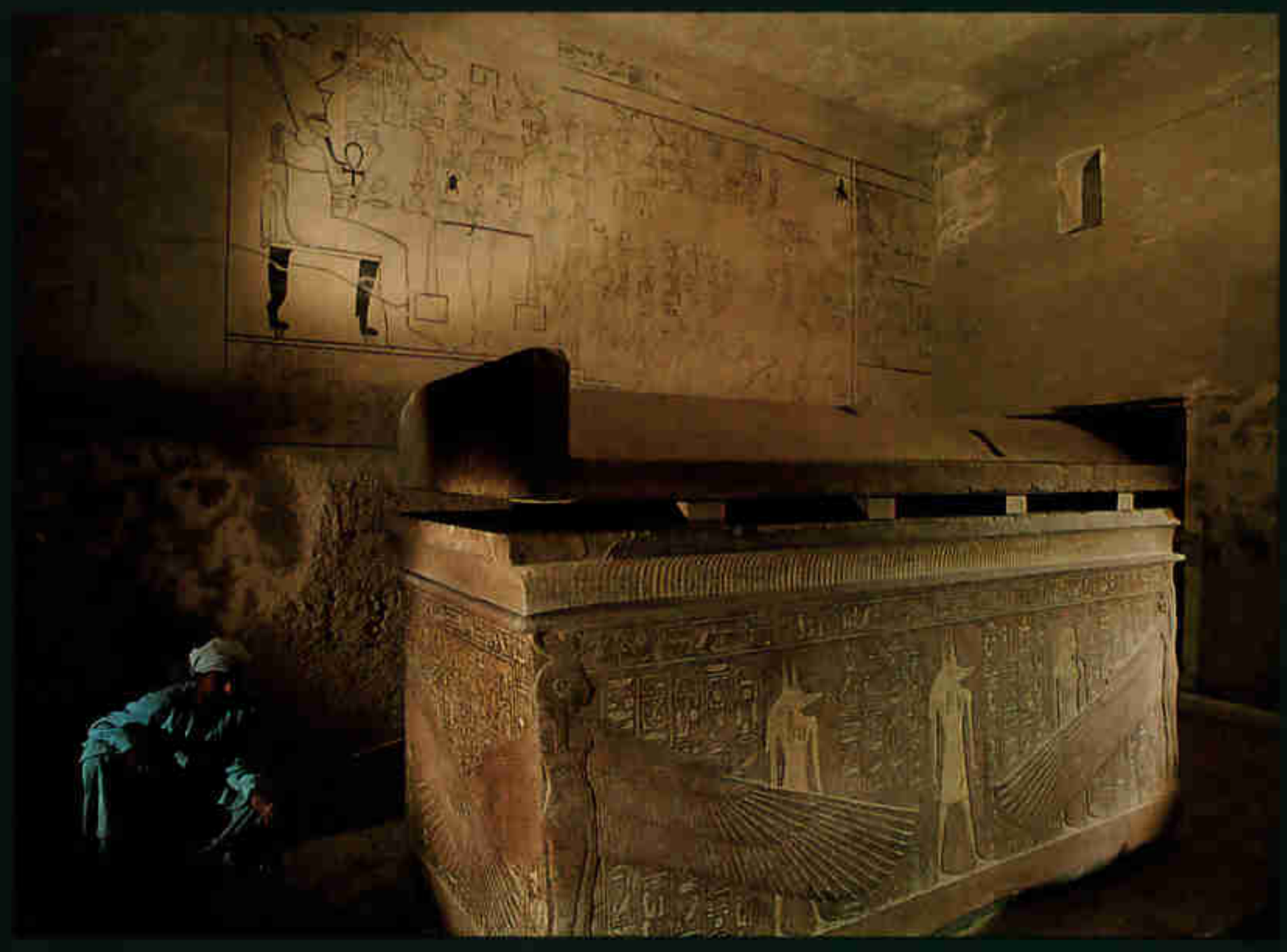
By KENT R. WEEKS

Photographs by KENNETH GARRETT

Art by CHRISTOPHER A. KLEIN
NATIONAL GEOGRAPHIC ARTIST







Tale of a tomb: In his life after death, Horemheb, who ruled Egypt from 1319 to 1292 B.C., makes a ritual offering of wine to Osiris, god of the afterlife. Murals, mummification, and Horemheb's ornate sarcophagus (top) all helped the king journey safely from this life to the next. Otherwise, Egyptians believed, the sun would not shine, the moon would not rise. Chaos would reign.

NO ONE HAD VENTURED inside the ancient Egyptian tomb since 1825, when a British traveler and draftsman named James Burton sketched its first few chambers. It lay somewhere near the entrance to the Valley of the Kings—burial place of New Kingdom pharaohs who ruled Egypt at the peak of its military power, between 1539 and 1078 B.C.

In 1827 John Gardner Wilkinson, one of the founders of Egyptology, designated the tomb KV 5—the fifth tomb beyond the entrance to KV, the Kings' Valley. Then for more than 150 years KV 5 was all but forgotten.

In 1989 I was directing a mapping project in the Valley of the Kings, and I wanted to relocate KV 5, not because it held treasures—it didn't—but because the roadway at the valley's entrance was being widened. The roadwork seemed likely to damage any tomb in its path, and that path, I believed, lay right above KV 5.

The tomb has turned out to be the largest ever found in the Valley of the Kings. It was a family mausoleum—the burial place of many of the sons of Ramses II. It contains at least 110 chambers, and its artifacts and hieroglyphs promise to change what we know about Ramses II, one of antiquity's most powerful rulers. During his long reign ancient Egypt controlled lands from present-day Sudan northeast into Syria. Of all the pharaohs he was the most prolific builder. To glorify his name, Ramses erected dozens of imposing temples and monuments along the Nile.

On a hot Tuesday morning in July 1989 our workmen began digging just east of the roadway. With crude homemade hoes they scraped away debris and carted it off in baskets made of old automobile tires—standard archaeological equipment in Egypt. A week of digging revealed traces of a tomb entrance. We could see that a narrow trench had been cut through the debris clogging the tomb's doorway. James Burton, I recalled, had dug just such a trench.

Assistant excavation director Catharine Roehrig, senior workman Muhammad Mahmoud, and I squeezed into the trench, painfully pulling and pushing ourselves over thousands of sharp limestone fragments. To our left and right the tomb was packed nearly to the ceiling with silt and limestone chips washed in by flash floods.

According to Burton's sketch, the third chamber was a cavernous pillared hall. Almost on cue, as we crawled along the trench, we could see the broken tops of massive pillars jutting up through the debris. The trench made a sharp turn to the right to avoid a pillar, then began weaving between two- and three-ton



slabs of limestone that had fallen from the ceiling. No part of the ceiling appeared to have collapsed since Burton's visit in 1825, but the fallen blocks were unnerving nevertheless. A headline flashed through my mind: "Egyptologists Flattened as Tomb Collapses. Pharaoh's Curse Returns."

After 20 minutes in the stifling heat we were ready to leave. Soaking wet, sweat streaking my glasses, covered in mud, and with my flashlight fading, I turned to Muhammad. "Do you remember where the entrance is?"

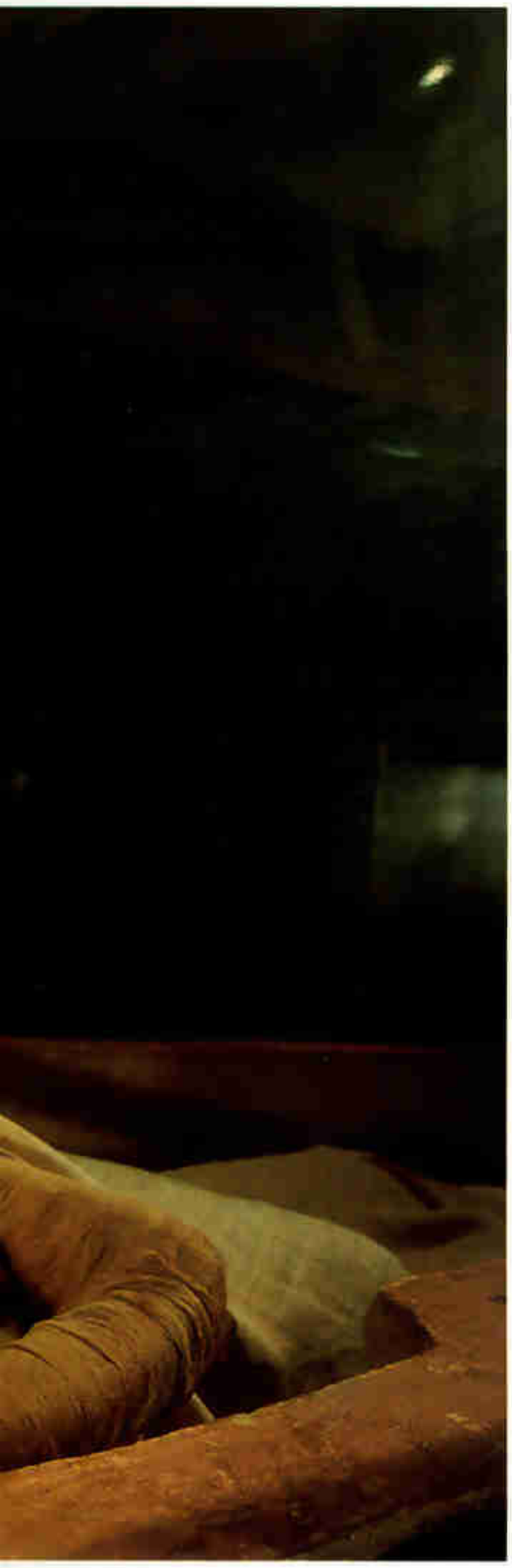
"No."

Catharine wasn't sure either. The hall was so filled with debris that we couldn't see more than a few inches in any direction.

"I think we came in from over there," Muhammad said. He crawled forward, looking for a recognizable pillar or scrape in the debris that would show where we'd been. Shining his flashlight around the chamber, he looked up at the ceiling for a moment, then called us over.

"Look," he said. Directly above him we could see crude black letters written with the smoke of a candle: BURTON 1825.

After a few more wrong turns we clambered out of the tomb. Catharine scraped mud from her clothes, wondering aloud about the tomb's original occupants. "Remember Elizabeth Thomas? She thought this might be a tomb for children of Ramses II. Thomas didn't have any proof, but she knew more about the Valley of the Kings than any other Egyptologist in this century. Her theory should be checked out."



Looking good for his age, the mummified remains of Ramses II, once entombed in the Valley of the Kings, now lie in state at the Egyptian Museum in Cairo. Ruling for 66 years, Ramses built more temples and monuments than any other pharaoh. He had numerous wives and concubines; he sired scores of children and outlived many of them. Recent evidence shows that Ramses' sons were buried in an extraordinary communal tomb.

I DECIDED TO BECOME an Egyptologist when I was eight, my interest in an ancient civilization winning out over dreams of intergalactic travel. Although my parents never tried to dissuade me from so unlikely a career, one aunt regularly pointed out that an interest in ancient Egypt couldn't possibly lead to a decent job. My friends, on the other hand, agreed that cutting open mummies and searching gold-filled tombs were worthy goals.

Not long after I took my Ph.D. in Egyptology from Yale, the Oriental Institute at the University of Chicago made me director of its field headquarters in Luxor, the modern town built atop ancient Thebes. Surrounded by so many tombs and temples, I had a wonderful opportunity to delve into the archaeology of the New Kingdom—Egypt's golden imperial age.

The warrior pharaohs of the New Kingdom conquered Palestine and Syria with horse-drawn chariots and other advanced military techniques. For three centuries Egypt was the strongest nation in the world. At Thebes the pharaohs built larger and grander temples to proclaim the might and wealth that made their religious capital "the queen of cities . . . greater than any other city." The city proper stood on the east bank of the Nile; the necropolis, with its royal temples and rock-cut tombs, lay on the west.

On weekends I would take a ferry across the Nile, rent a bicycle or hire a taxi, and head off to the well-known sites. When I began looking for the more obscure monuments, I often couldn't find them.

"I'd like to see the tomb of so-and-so," I'd say to one of the antiquities inspectors.

Stuck between a rock and a hard place, author Kent Weeks (in hat) and his excavation foreman, Ahmed Mahmoud Hassan, examine a tomb known as KV 5, rediscovered in 1989. Recurrent flash floods have packed the tomb with

debris, which engineers concluded was the only thing holding up the roof in the central chamber. Postponing further excavation here, Weeks investigated a doorway at the back of this pillared hall. "We wondered what lay on the other side."

"I've heard of it," he'd reply. "Do you know where it is?"

"Don't *you* know where it is?"

"No. The old guard Sheikh Taya, he probably knew, but he died."

Of the tombs crowding the Theban necropolis, few had been mapped by the early 1970s. It was easy to see why: In a four-square-mile strip between the desert mountains and the Nile floodplain lie thousands of tombs, temples, shrines, palaces, and villages—more than in any other part of Egypt, probably more than anywhere else in the world. In some places the tombs are so close together you can crawl from one into another, moving hundreds of feet underground before returning to the surface. In the Valley of the Kings alone, more than half of the tombs are still largely unexcavated—and the burial places of several New Kingdom pharaohs have yet to be found.

The need for a comprehensive map of Thebes struck me as urgent, and I decided to do something about it.

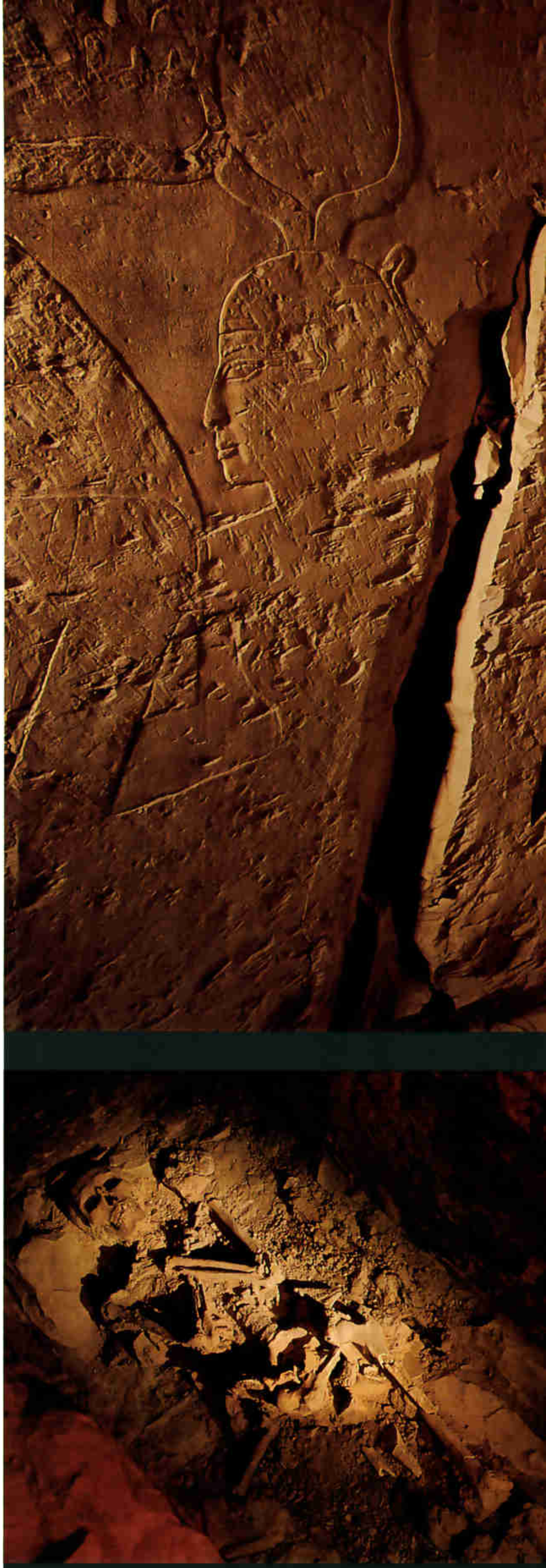
MAPPING the Theban necropolis entirely from the ground would take my team decades. Aerial photographs would save time.

In 1982 we made the first ever hot-air balloon flight over Thebes. Never before had I seen anything more beautiful than the necropolis at sunrise from a thousand feet in the air. The bright, early morning light slanted across the landscape, and we photographed Thebes from angles rarely seen before. Though our flight lasted only an hour, we shot more than 20 rolls of film.

We could hear every sound on the ground. Dogs barked incessantly as the noise of our burner disturbed their sleep. Villagers emerged from their homes as we floated overhead, looking up in amazement, saying over and over, "My God! God is great! My God!"

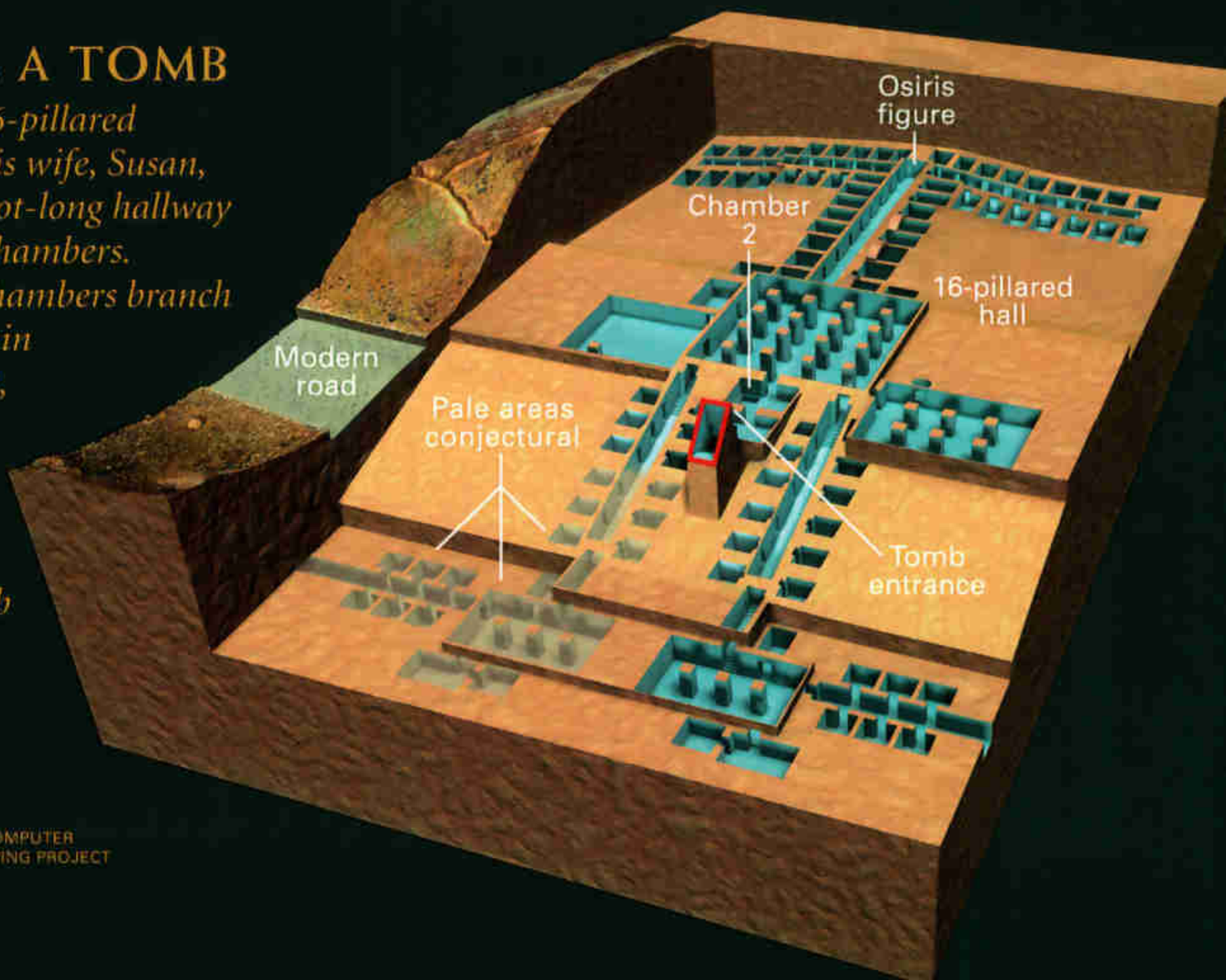
As we landed, a blue pickup sped toward the site. The local police chief got out and walked toward us. In our excitement we had failed to inform him of our flight.

KENT R. WEEKS is director of the Theban Mapping Project and professor of Egyptology at the American University in Cairo. This article is adapted from his forthcoming book, *The Lost Tomb*. KENNETH GARRETT photographs archaeological subjects all over the world.



DECRYPTING A TOMB

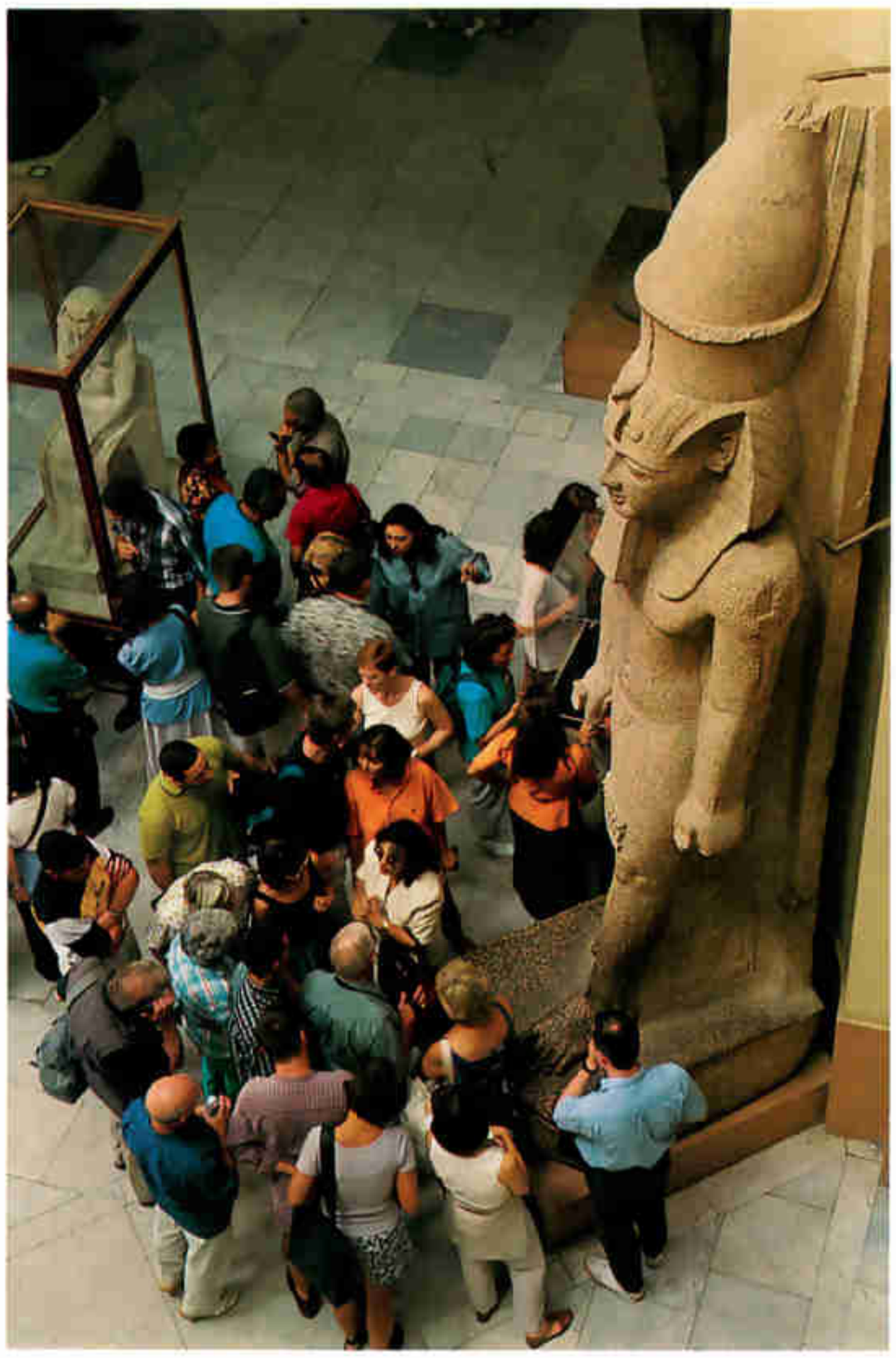
Beyond KV 5's huge 16-pillared chamber, Weeks and his wife, Susan, examine a hundred-foot-long hallway lined with doors and chambers. Two halls with more chambers branch from the end of the main passage. In Chamber 2, excavators unearthed three skulls and the skeleton of an adult male (left). This uniquely complex tomb (plan, right) was built for sons of Ramses II, many of whom died before their father.



ART BY DAVID C. FIERSTEIN, BASED ON COMPUTER MODEL BY WALTON CHAN, THEBAN MAPPING PROJECT

"Why didn't you tell me what you were doing?" he demanded angrily. "Hussein, the schoolteacher, thought you came to invade Egypt. He wanted to shoot you down, and I had to confiscate his gun. This is very bad."

"We are very sorry, sir," I said. "I assure you we did not mean to ignore you. You are the most senior official in this village, and your cooperation is very important to our project. Would you like to come up in the balloon tomorrow? We could show you our work."





Pharaohs only rarely commissioned art that featured their children, but Ramses II decorated many temples with images of his sons and daughters. On the walls of his royal temple (right) outside the valley, his sons form a procession beneath their father, who faces the god Amun-Re. Ramses' son Merneptah inherited the throne, and today his monuments (left, at right) draw crowds just as his father's do.

The police chief smiled. "That would be very nice. Yes, I will meet you at sunrise. And do not worry about the schoolteacher. I told him that you were not the enemies of Egypt."

I HAD ASSUMED that making architectural plans of the tombs in the Valley of the Kings would be a simple task. How complex could tombs be that had been surveyed with a carpenter's square, plumb bob, and piece of string and then carved with chert axes and copper chisels? My team of architects and surveyors, on the other hand, had state-of-the-art equipment and a high degree of naive, can-do cockiness.

We seriously underestimated the ancient Egyptians. Tombs we thought could be easily plotted from, say, 500 measurements, often required *thousands;* tombs we thought could be mapped in a few days took weeks.

Just crawling into the tombs was difficult. To avoid damaging plastered walls and mummies that lay half-buried in debris, we wriggled into pitch-black spaces barely wide enough for our shoulders. Sometimes we would startle a sleeping desert fox or dozens of bats hanging from the ceiling.

The men who dug the royal tombs lived about a mile south of the Valley of the Kings. Their village, Deir el-Medina, offers a fascinating glimpse into everyday Egyptian life. From thousands of inscribed limestone fragments called ostraca—the Post-it notes of ancient Egypt—we know the names of the



residents. We know where they lived, when they died, and where they were buried. We even know when they took ill or went on holiday, what they ate, and what they bought and sold.

More than three thousand years ago Deir el-Medina was home to a hundred sculptors, woodworkers, quarrymen, painters, and plasterers. They lived with their wives and children in nearly 70 single-story houses strung along a lane hardly wide enough for two donkeys to pass. Each house had rooms for receiving guests and for sitting and sleeping, a kitchen, and a shaded roof terrace. Wall niches held statuettes of household deities.

In small cellars the workmen stored food they received as payment for their services. What were they paid? An ostracon from the mayor of Thebes to the crew foremen gives the answer: "Please have the wages delivered to the necropolis crew comprising vegetables, fish, firewood, pottery, small cattle, and milk. Don't let anything thereof remain outstanding. [Don't] make me treat any part of their wages as balance due. Be to it and pay heed!"

More than at any other site in Egypt, in the workers' village I feel the presence of people with whom we share familiar emotions and concerns. Listen to two ancient voices—the scribe Pabaki addressing his father, the draftsman Maani-nakhtef:

"I have heeded what you told me, 'Let Ib work with you.' Now look, he spends all day bringing the jug of water, there being no other task charged to him, each and every day. He hasn't heeded your admonition to ask of him, 'What have you accomplished today?' See, the sun has set, and he is still far off [with] the jug."

Workmen left the village early each morning

ANCIENT EGYPT'S ROYAL ERAS

Archaic period	Old Kingdom	First Intermediate	Middle Kingdom	Second Intermediate
2920 B.C.	2620 B.C.	2170 B.C.	2080 B.C.	1760 B.C.

A GRAVEYARD FOR ETERNITY

Pyramids were the tombs of choice for pharaohs of Egypt's Old Kingdom, whose political world was centered on Giza and the Nile Delta region. So too was their gateway to the netherworld. But pharaohs of the early New Kingdom traced their dynastic roots farther south to Thebes (present-day Luxor) and wanted their tombs built closer to home.

Between 1539 and 1078 B.C., practically all pharaohs were buried in the Valley of the Kings.

Because its primary peak, called el-Qurn, resembled a pyramid, the new necropolis resonated with a powerful symbolic charge. The site also seemed more secure. Sentries stationed at the valley's only entrance could discourage tomb robbers. Or so the kings hoped.

Nonetheless, most tombs had been ransacked by the time archaeologists began excavating in the early 1800s. Since then 62 tombs, many of them royal, have been discovered here, each one assigned a KV, or Kings' Valley, number, usually in the sequence in which it was found.

In ancient days the memory of dead kings was kept alive by funerary cults. Devotees celebrated not at the tombs, however, but at royal temples built on the plain between the valley and the Nile River. Together the tombs and temples formed a City of the Dead, or what one Egyptologist called "the royal funerary machine."

KV 35

KV 14

KV 15

KV 38

KV 47

KV 57

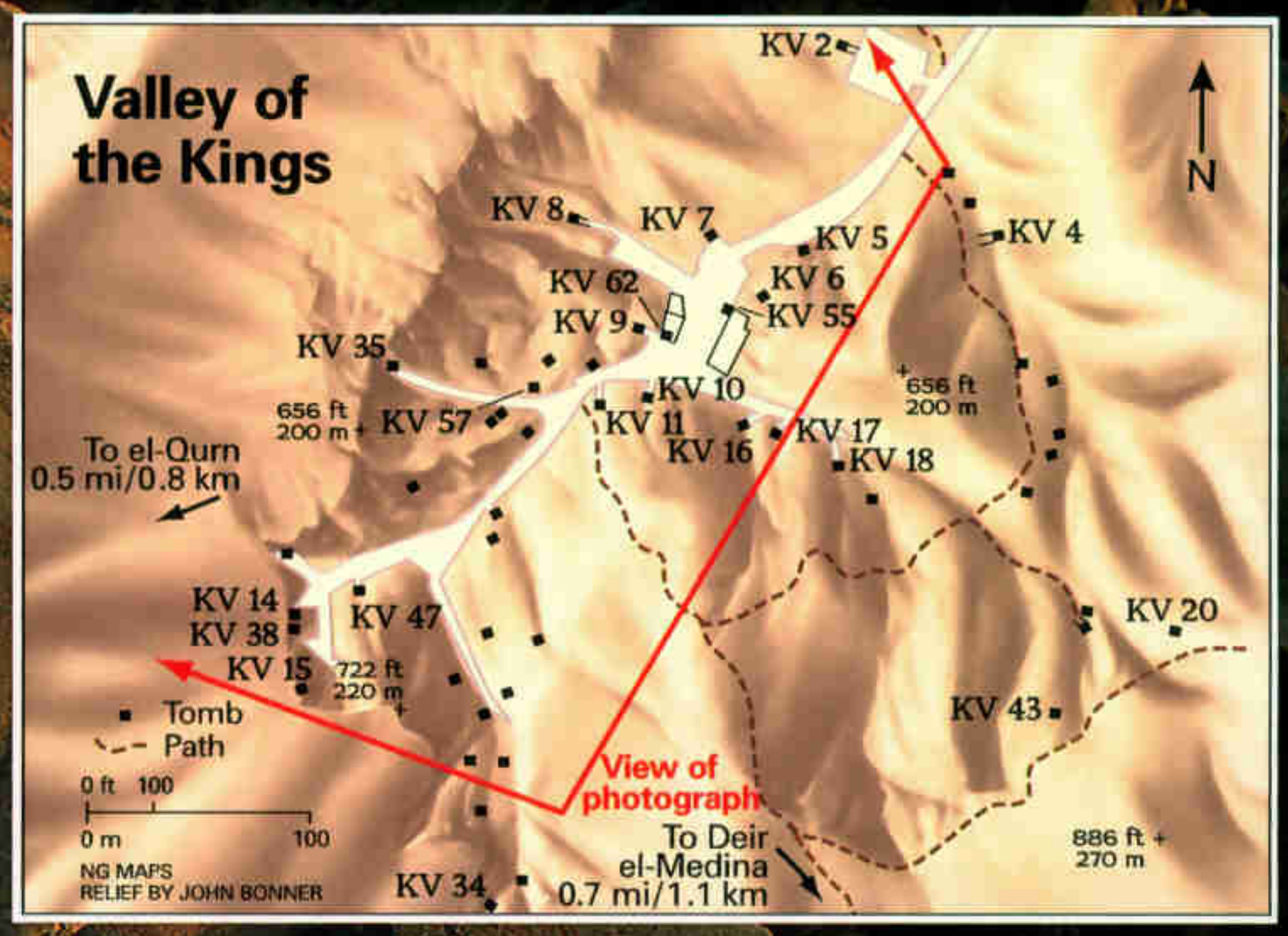
NEW KINGDOM

18th Dynasty	19th	20th	Late period	Greco-Roman age
1539 B.C.			1078 B.C.	332 B.C. 30 B.C.

NEW KINGDOM PHARAOHS

18TH DYNASTY		
Ahmosis	1539-1514	
Amenophis I	1514-1493	KV 39?
Thutmosis I	1493-1483	KV 20
		KV 38
Thutmosis II	1483-1479	
Hatshepsut	1479-1458	KV 20
Thutmosis III	1479-1426	KV 34
Amenophis II	1426-1400	KV 35
Thutmosis IV	1400-1390	KV 43
Amenophis III	1390-1353	
Akhenaten	1353-1336	KV 55?
Smenkhkare	1334-1333	
Tutankhamun	1333-1323	KV 62
Ay	1323-1319	
Horemheb	1319-1292	KV 57
19TH DYNASTY		
Ramses I	1292-1290	KV 16
Seti I	1290-1279	KV 17
Ramses II	1279-1213	KV 7
Merneptah	1213-1204	KV 8
Seti II	1204-1198	KV 15
Amenmesse	1203-1200	KV 10
Siptah	1198-1193	KV 47
Tawosret	1193-1190	KV 14
20TH DYNASTY		
Sethnakhte	1190-1187	KV 14
Ramses III	1187-1156	KV 11
Ramses IV	1156-1150	KV 2
Ramses V	1150-1145	KV 9
Ramses VI	1145-1137	KV 9
Ramses VII	1137-1129	KV 1
Ramses VIII	1129-1128	
Ramses IX	1128-1110	KV 6
Ramses X	1110-1106	KV 18
Ramses XI	1106-1078	KV 4

Based on research by Rolf Krauss, Egyptian Museum, Berlin



So many tombs, temples, shrines, and other ruins blanket Thebes that Egyptologists have been kept busy here for nearly two centuries. "It is," says the author, "the richest archaeological site on Earth."







and spent an hour climbing over the hill to the Valley of the Kings. At the end of the day they returned along the same path—unless they chose to spend the night in one of the stone-walled rest houses on the hilltop.

IT TAKES ME less than half an hour to hike from Deir el-Medina to the hilltop. A cool breeze—the "sweet breath of the north wind" to the ancient Egyptians—nearly always blows, making hot summer days bearable.

Seated on a rock outcropping with my back to the Valley of the Kings, I peer down on a series of stony hills pockmarked with the entrances to hundreds, perhaps thousands of private tombs from the New Kingdom; most have been plundered but not excavated. Half a mile farther east stand the royal temples of nearly two dozen pharaohs, with great stone columns and pylons and thick brick walls jutting from the desert sand.

Between the desert and the Nile a dozen mud-brick villages still hum with the ageless rhythms of daily life. Children swat sheep and goats down narrow paths, stirring up dust that makes them appear to walk on clouds. Young boys sit astride water buffalo submerged to their necks in the muddy water of an irrigation canal. The panorama reminds me of scenes painted on the walls of the ancient tombs.

At 8 a.m. the temperature on my hilltop has already climbed to 95°F. The sky is cloudless. The modern town of Luxor lies four miles away on the east bank; I can make out the tops of the temple pylons at Karnak and Luxor through the palm trees. Several tourist boats on the Nile jockey for moorage.

Nothing disturbs the tomblike silence up



Sacred stories unfold across 16 chambers and corridors in the tomb of Seti I, father of Ramses II. "For the Egyptians, the plan of a tomb was like a road map from this world to the next," says the author. "The tomb's decorations were like a guidebook." Few people, though, were meant to see this guide to the afterlife. Built neither as a public memorial nor to impress posterity, the tomb served as an instrument, the means to a new beginning.

here, except for the whisper of the breeze, the occasional barking of a dog, and the crying of a child in a distant village.

AT FIRST GLANCE the Valley of the Kings seems little different from hundreds of other valleys at the desert's edge. Shaped like a human hand with fingers splayed, the Valley of the Kings covers only about seven acres—smaller than nearby valleys. Towering over it is el-Qurn, a 1,500-foot peak shaped like a pyramid. Some Egyptologists believe that this natural symbol of the sun god Re led to the selection of the Valley of the Kings as the site of royal tombs. Another reason was security: There's only one narrow gorge leading into the valley.

By the time Roman travelers hiked the rocky trail and scratched their names on tomb walls, ancient robbers had despoiled most of the royal mummies and carted away the treasures buried with them so that the deceased could live as they had on Earth—furniture, papyrus scrolls, amulets, jewelry, ritual objects, statues. Napoleon Bonaparte brought a team of scholars to record Egyptian antiquities when his army invaded in 1798, and adventurers and archaeologists in the 19th and 20th centuries entered tomb after tomb.

One of the largest and best decorated tombs is that of Seti I, the father of Ramses II. Seti, who did much to promote prosperity during his 11-year rule, overran Palestine, made peace with the Hittites in Syria, opened mines and quarries, and enlarged the great Temple of Amun-Re at Karnak. The discovery of his tomb by Giovanni Battista Belzoni in 1817 caused as much furor in the European press as that of Tutankhamun's tomb 105 years later.

Italian by birth and a hydraulic engineer by training, the flamboyant Belzoni had toured Europe in a vaudeville show in which he carried a dozen men perched on an iron frame braced on his shoulders. In 1815 he sailed to Egypt and over the next two years uncovered four royal tombs. Seti's was the most famous.

Painted reliefs, drawings, and hieroglyphs covered almost every wall, pillar, and ceiling. In the burial chamber Belzoni gazed up at a dark blue vaulted ceiling that glistened as if painted the day before. Red stars overlay figures representing the constellations as the ancient Egyptians saw them—Ursa Major as an ox, Cygnus as a man with arms outstretched, and Orion as a running man.

As Belzoni's flickering candle shone on Seti's sarcophagus, its translucent alabaster glowed in the gloom. Nothing like it had been seen before, but gone were the mummy and almost everything else that was movable.

The mystery of Seti's missing mummy was solved in 1881, when the notorious Abd el-Rassul family confessed to plundering a tomb they had discovered hidden behind a nearly inaccessible crevice. Ancient priests, fearing grave robbers, had stashed Seti's remains and 40 other mummies there.

Seti's mummy now rests in the Egyptian Museum in Cairo. X-rays show that before death the pharaoh lost a tooth. After death the head and neck were broken from the body and the abdomen was crushed, perhaps by









BUILDING A TOMB FIT FOR A PHARAOH

No sooner did Seti I ascend the throne of Egypt in 1290 B.C. than he began planning and building his royal tomb.

First, stonecutters chipped away at the valley's limestone and shale, carving out hallways and chambers (above, at left). Other craftsmen followed, transforming this crude cave into an intricately ornamented grave (insets, top). The size of the workforce varied from a few laborers to more than a hundred.

Breathing too must have become a chore as workers inhaled air laden with plaster and stone dust. To deal with the darkness deep in the tomb, they burned pottery lamps fitted with linen wicks and fueled with oil or fat mixed with a bit of salt to inhibit smoke.

When their work was





CRAFTING AN AGELESS PORTRAIT

Stonecutters chisel out a chamber, leaving behind raw rock walls. A coat of plaster creates a smooth surface on which an artist renders his subject in rough outline. A master painter makes corrections and adds details to guide the bas-relief sculptor who follows. Finally, another artisan gives the portrait its royal finish.

nearly complete, laborers hauled a stone sarcophagus, at top right, down to the burial chamber. Seti I died in 1279 B.C., and the grave builders had just 70 days—while priests mummified his body—to ready the tomb to receive the pharaoh's remains.

Contour of hill

Tomb entrance

Area shown enlarged

PAINTING AND DIAGRAM BASED ON COMPUTER MODEL BY WALTON CHAN, THEBAN MAPPING PROJECT; INSET ART BY DAVID C. FIERSTEIN



the priests who transported the mummy to its secret grave.

Seti I died in June 1279 B.C., and Ramses II took charge of his father's funeral. After the priests wrapped the mummy and placed it inside several nesting coffins, a flotilla bearing priests and officials, ceremonial vestments, incense, and funerary furniture set off up the Nile from the delta toward Thebes. Peasants lined the riverbanks. Some cheered their new pharaoh; others stood in silent prayer, mourning the old.

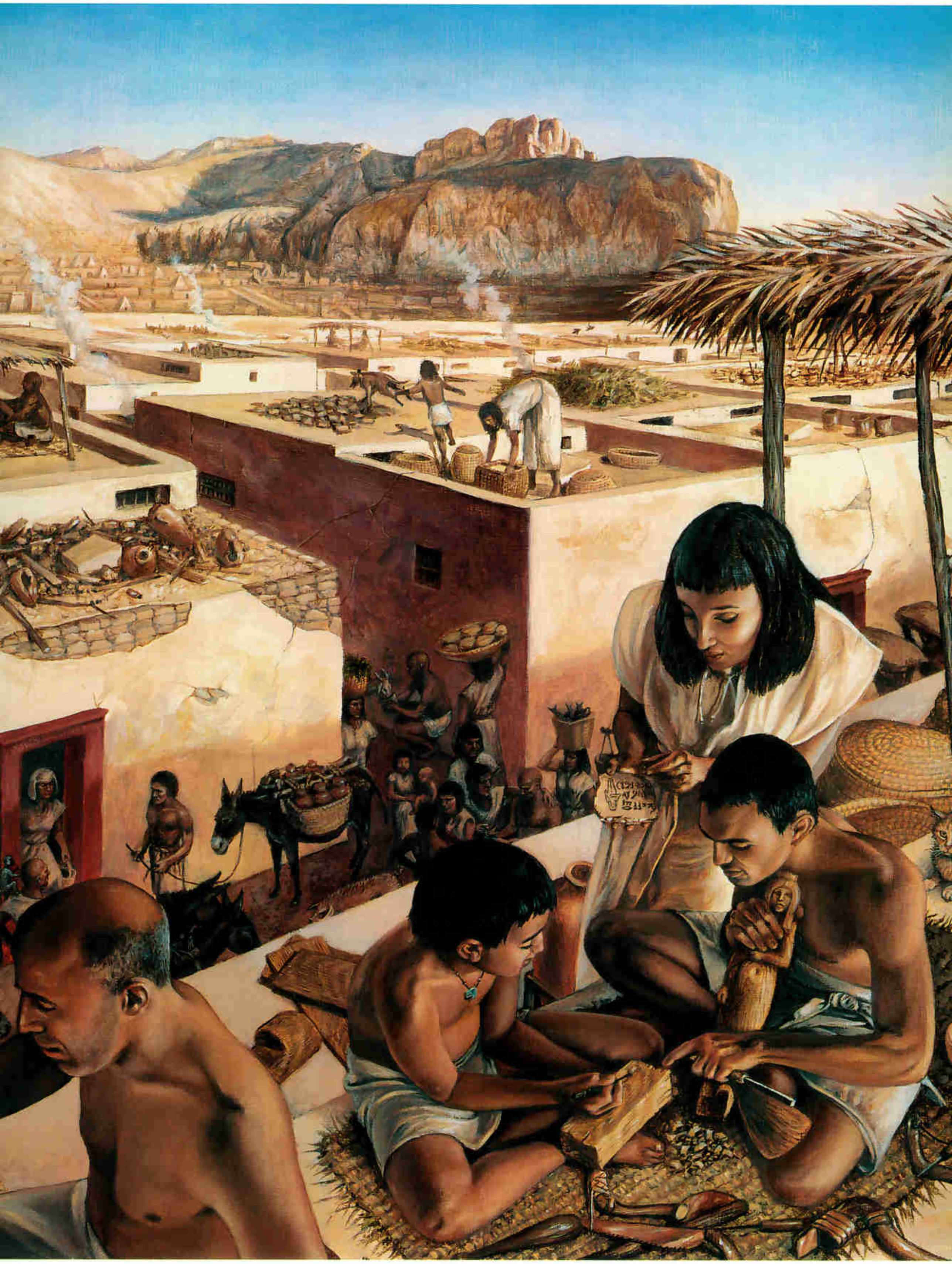
When the flotilla reached Thebes, probably in August, priests received the mummy and performed ceremonies in the major temples. I can imagine the great procession leaving the Temple of Amun-Re at Karnak, crossing the Nile, and sailing along a canal that cut westward through farmland toward Seti's royal temple. There the procession stopped while the priests performed ritual ceremonies so the mummy could thrive in the afterlife.

Proceeding on foot, the cortege climbed through the barren hills to the Valley of the Kings and Seti's tomb. The mummy was laid to rest in the burial chamber, along with everything needed for the journey into the afterlife: the Book of the Dead, containing spells to protect the deceased; mummy-like statuettes called ushabti to act as servants; offerings of food and wine; and jewelry and furniture to make the afterlife more comfortable. Not until Ramses II died 66 years later would this ceremony be performed for another pharaoh.

ARTISANS OF THE AFTERLIFE

The village of Deir el-Medina, which has undergone extensive excavation (above), was home to the craftsmen who built the royal tombs. The men worked an eight-day week, then spent a two-day weekend at home with their wives and families (right). Some used their off hours to freelance—carving or painting furniture and ritual objects, lower left, for private clients. Fathers taught their crafts to their sons, lower right. Others prepared for the week ahead by bartering portions of their salary—fish, vegetables, oil, and grain—for other household supplies.







In 1995, six seasons after we began work in KV 5, a European television reporter visited us. When she asked what we were digging at the moment, I described our work in the 3,600-square-foot pillared hall.

"This is one of the largest pillared halls ever found in an Egyptian tomb," I said.

"*Did you also find colored balls?*"

I did a double take. "I'm sorry?"

"I mean, were billiard halls common in ancient Egypt?"

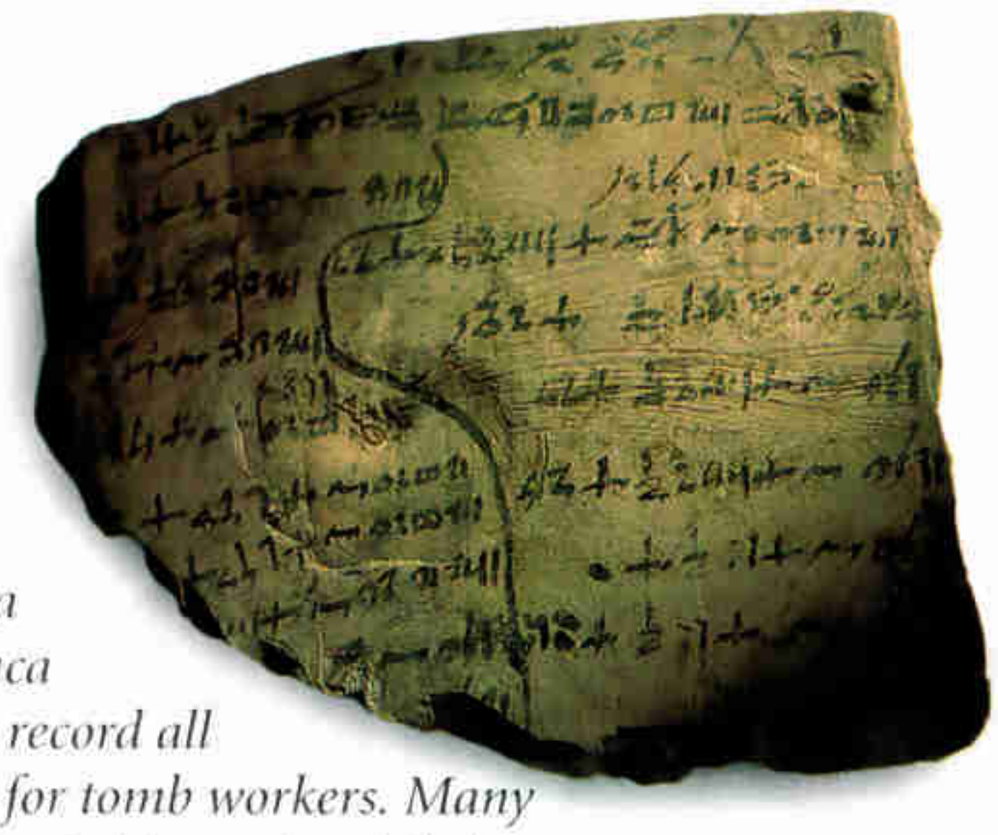
I had trouble keeping a straight face as the camera rolled. When the interview was done, I suggested we tape it again, but she declined.

After clearing the doorway in the rear wall of the pillared hall, we began digging in the chamber beyond, which we assumed would be small. When I struggled through the narrow crawl space into the chamber, Muhammad Mahmoud was there with Marjorie Aronow, a University of Michigan Egyptology student.

"Look," Muhammad said, pointing to a gap in the wall of debris that lay ahead.

I shone my flashlight into the gap; there was nothing but blackness. Strange, I thought. The light should reflect off a wall. Crawling forward, we found that the corridor, which was about nine feet wide, continued a hundred feet into the hillside. There was one door on the left, another on the right, then two more, then four. We counted doors as we crawled forward: 10, 12, 16, 18. Other tomb corridors in the Valley of the Kings have at most one or two doorways cut into their walls. I had never seen





The business of death has always leavened life around the valley. These days, archaeological excavations employ teams of laborers, many of whom live near the necropolis in villages like Qurna, where bread takes shape the old-fashioned way (left). Contemporary understanding of life here 3,200 years ago comes partly from a mother lode of artifacts called ostraca (right), shards of limestone used to record all sorts of daily details, such as wages for tomb workers. Many craftsmen and their families were buried in tombs of their own, reflecting the relative affluence of this working class. Images in their tombs (below) depict a bucolic netherworld devoid of the cosmic responsibilities eternally shouldered by the pharaohs.



a corridor like this one in any Egyptian tomb.

Muhammad pointed his flashlight down the corridor. "What's that?" he asked suddenly.

"Oh, my God!" Marjorie gasped. As we turned our flashlights that way, a human form took shape. Muhammad began whispering a prayer from the Koran.

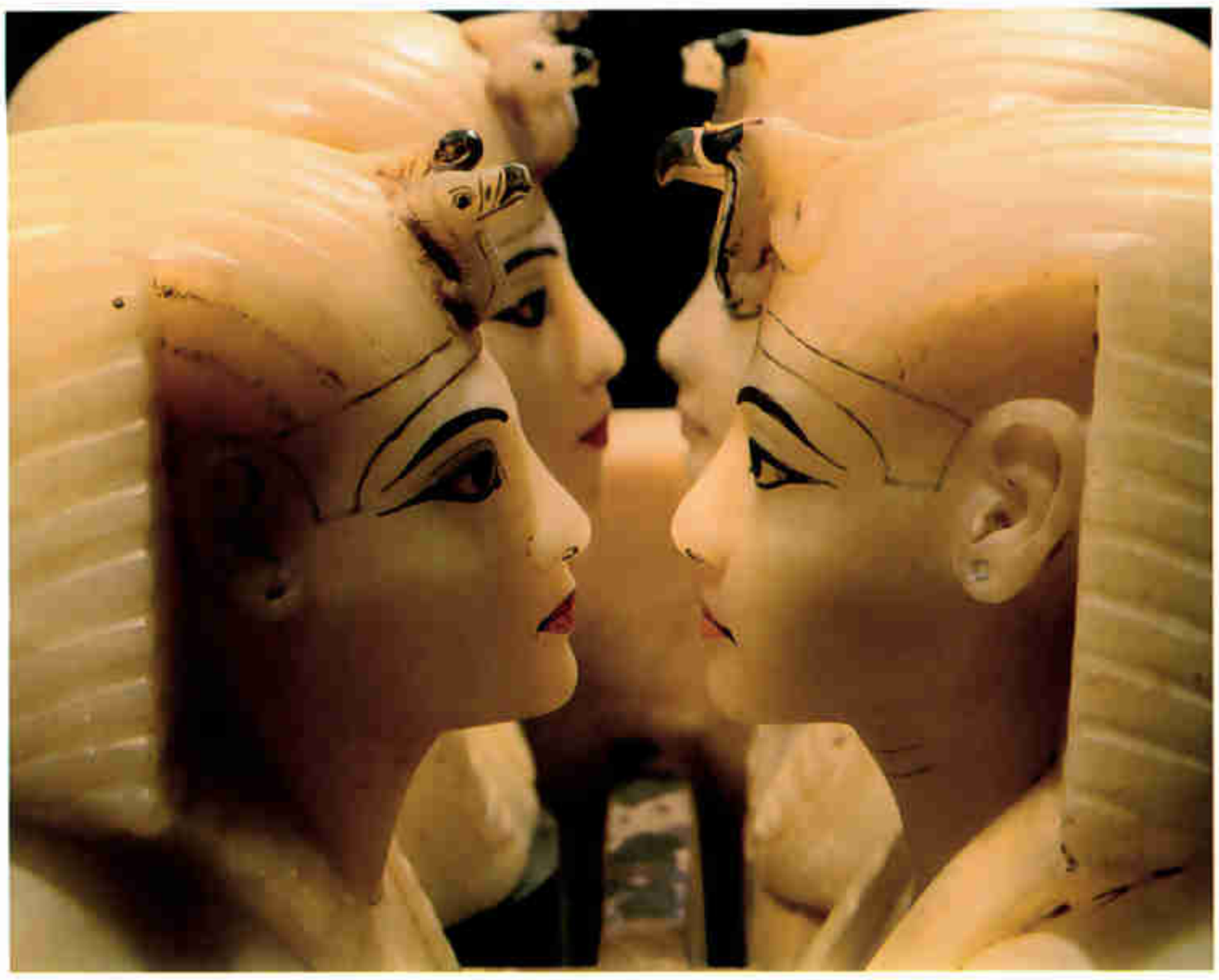
The figure stood ghostlike in a niche at the end of the corridor. As we inched closer, the form became clearer: It was a five-foot carving coated with plaster painted gray-green. Even though the face was missing, we recognized it as the quintessential god of the afterlife, Osiris, who is often shown as a mummiform figure with his arms crossed over his chest. Each hand held a shepherd's crook and a flail.

We sat for several minutes at Osiris' feet, slowly moving the flashlight beam over the figure from head to toe, again and again. It was a strange feeling, sitting 200 feet underground in utter silence, our light focused on an image of the god of the afterlife. For an instant it was 1275 B.C. again, and this *was* ancient Thebes. I could imagine priests chanting prayers and shaking tambourines. I could feel the floor tremble as great sarcophagi were dragged down the corridor. I could smell incense and feel priestly robes brush my arm as the funeral procession moved slowly past.

Finally I aimed my beam at the doorways to the left and right of the statue. More surprises. These doors didn't lead to small side chambers, as the other doorways in the corridor did, but into yet other corridors that extended even

Preserving the dignity of a dead king, mortuary priests placed the mummy of Pharaoh Tutankhamun in a solid gold coffin (above), which was nestled in a wooden coffin, which was tucked inside yet a third. Nearby chambers held Tut's

legendary trove of funerary goods, including several royal chariots. If a young king who ruled only briefly was buried with such treasures, what then might the tombs of the great pharaohs have contained before grave robbers plundered them?



deeper into the bedrock. And there were yet more doorways cut into *their* walls.

"I can't believe it," Marjorie kept repeating.

Suddenly KV 5 had gone from a small, unimportant tomb to . . . to what? We crawled back down the corridor, re-counting the doors.

"There have to be over 65 chambers in the tomb," I said—underestimating, as we later discovered. No tomb in the Valley of the Kings has more than 30 chambers; most have only six or eight. Many tombs plunge straight into the steep hillsides, but KV 5 resembles an octopus surrounded by its tentacles.

And there was something else: Inscriptions in Chambers 1 and 2 indicated that KV 5 was the burial place of several sons of Ramses II. Ramses "Junior," the second son, bore titles similar to those of his elder brother, Amonherkhopshef: "Fan-bearer on the King's Right Hand, Heir, Prince, Royal Scribe, General, King's Eldest Son, First King's Son and First of His Majesty, Beloved of Him, Ramses." Of the 30-plus sons, we knew that Merneptah was buried in his own tomb in the Valley of the Kings; two others may also have had separate tombs. Could the rest be here in KV 5? Could the corridors to the left and right of the Osiris figure slope downward to a lower level of rooms? Or might other corridors descend to a cluster of burial chambers? It will probably be many more years before we find out.

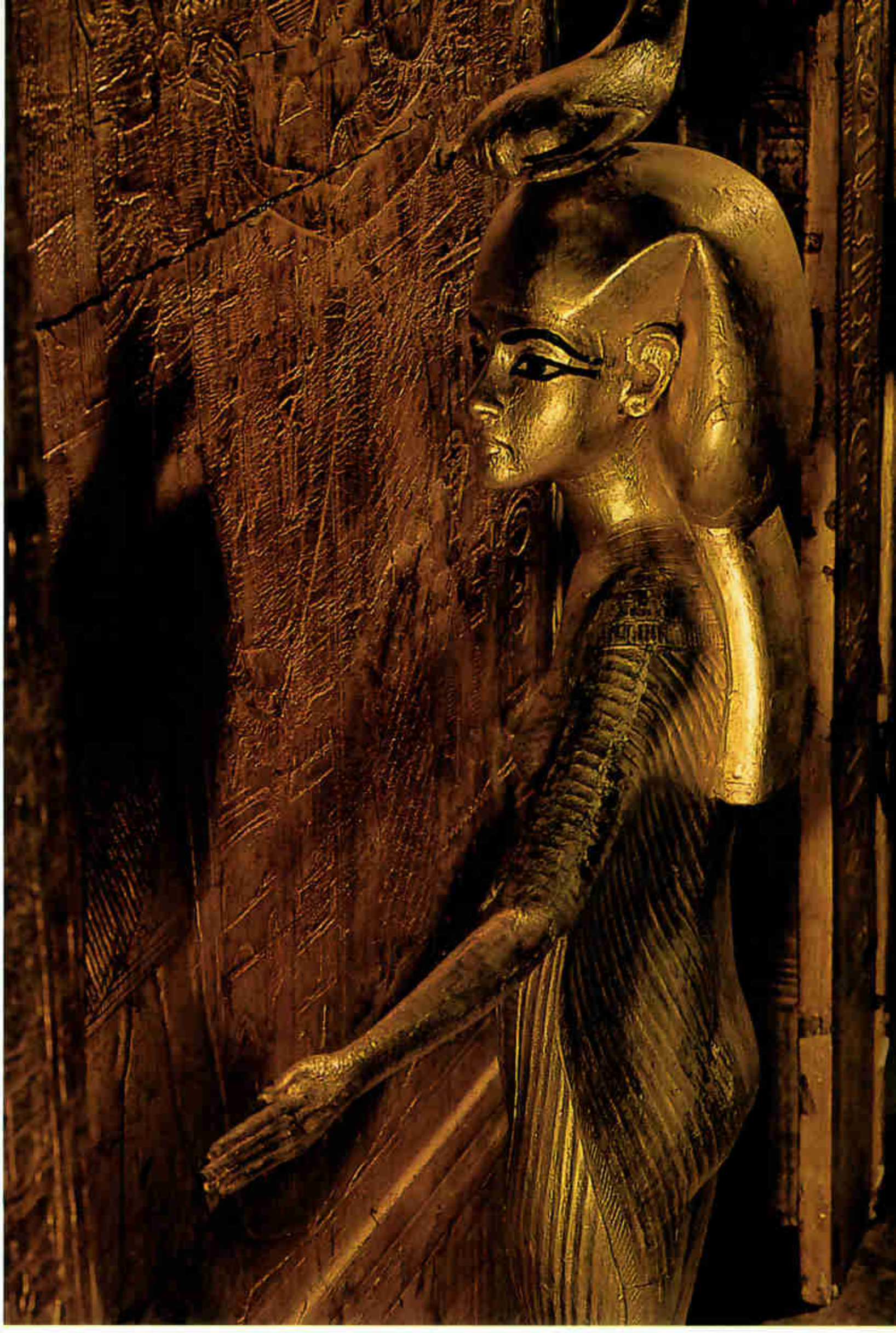
Marjorie, Muhammad, and I were the first people in millennia to see these corridors, to touch these carvings, to breathe this stale air. What a humbling experience to sit where Ramses II had come on sad occasions to bury his sons. None of us said a word.

Twenty minutes later we crawled out of the tomb, sweating and filthy and smiling. As the magnitude of our discovery began to sink in, I thought to myself: "I know how we're going to be spending the next 20 years."

OUTLIVING at least 12 of his sons and his favorite wife, Nefertari, Ramses II ruled for an impressive 66 years. During his long reign Ramses expanded and secured Egypt's borders and built grandiose temples and colossal statues of himself and Nefertari up and down the Nile Valley.

Ramses II was tall for an ancient Egyptian, five foot eight, until arthritis forced him to stoop. Slight but well muscled, he had a narrow chin, high cheekbones, an aquiline profile, and large ears. His teeth were so severely worn that the pulp cavities and nerves were exposed; his gums were badly abscessed. His red hair must have set him apart from the typically dark-haired population of Egypt and western Asia.

Ramses II died in August 1213 B.C., when he was about 90 years old. His tomb, which lies less than 200 feet from KV 5, remains one of the great unknowns in the Valley of the Kings. Though the entrance corridor has been accessible since antiquity, thick layers of flood debris still fill most of the tomb, so our knowledge of its art and architecture is sketchy.



Mummification preserved not only a king's skin and bones but his internal organs too, ensuring that the pharaoh's spirit had a body in which to dwell when he revisited his earthly realm. The lungs, stomach, liver, and intestines of King Tut, for instance, were treated with a preservative and stored in a four-chambered alabaster chest sealed with head-shaped stoppers (left). Tut's viscera were entombed inside a gilded wooden shrine protected by a quartet of goddesses, including Selket (right).

When our Theban Mapping Project worked there, the debris was so deep we were often unsure whether we were walking down sloping corridors or silt-covered stairways.

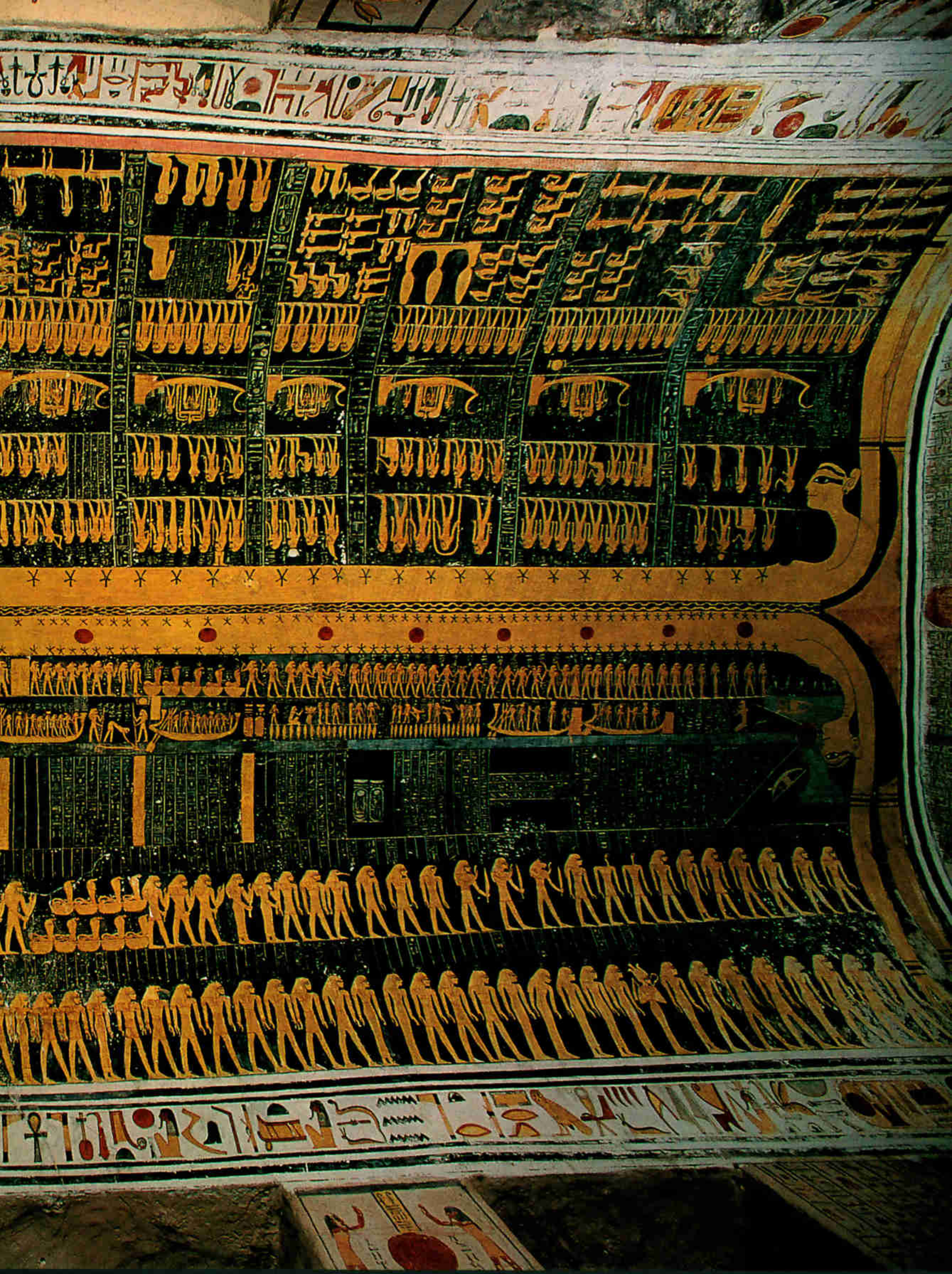
By contrast, the tomb of Ramses' beloved Nefertari is well known. It is the largest and loveliest in the nearby Valley of the Queens. We know little about Nefertari herself, for custom seems to have dictated that the biographical details of royal wives go unrecorded. Perhaps the daughter of a Theban nobleman, Nefertari was one of the first women wed to Ramses II. Paintings depict her as beautiful. Her skin is rosy, unlike the pale yellow that characterizes females in most Egyptian paintings. Her high status as principal wife earned her an honor enjoyed by only a few Egyptian women before her: She was deified in her lifetime.

RAMSES TOO WAS WORSHIPED as a deity in his own time. Since he was a living god, his sons attended to many of his secular duties—settling legal disputes, conducting foreign relations, and overseeing Egypt's agriculture, irrigation, and economy. This may explain why a tomb as unusual as KV 5 came into existence. His sons held positions of greater responsibility than crown princes had in the past, so when they died before he did, each was given a tomb more elaborate than that of an ordinary prince. Each may have had not only a burial chamber but also several beautifully decorated rooms filled with offerings and funerary goods.

This past year we unearthed an adult male skeleton from a pit in Chamber 2. A son of Ramses II? Our workmen talked excitedly about that possibility. I warned them that the bones might have come from a later burial or been washed into KV 5 by flash floods, but nothing diminished their enthusiasm.

"You know," one workman said, "Egyptian mummies are stuffed with gold. Even if we can see only bones now, there will be gold too."

Arcing across the ceiling of Ramses VI's tomb, dual images of the sky goddess Nut bracket scenes from sacred texts meant to help the pharaoh navigate his way through the netherworld. Such texts reflect an exceedingly complex set of religious



narratives. The Egyptians, writes historian Paul Johnson, "never discarded any idea they had conceived, preferring, whatever the cost in logic or consistency, to attach to it . . . any additional ideas or explanations as they occurred."

"I will be on television," another said. "My mother will be so proud."

Toward the center of the pit we uncovered the mummified leg of a young cow lying on top of more traces of human bone. This must have been one of the food offerings brought to the tomb to sustain the deceased in the afterlife. Another day we found three human skulls.

Excavating the skeleton proved extremely difficult: The bones were soft, and the fragments were embedded in a cement-like matrix of mud and limestone chips. We had to work with dental picks and artist's brushes to loosen the debris and gently brush it away. Some bones were in such bad shape that we had to apply a thin solution of adhesive every few minutes to keep them from disintegrating.

I squatted in a space only 30 inches wide, braced against the wall with one hand to keep from falling over while I cleaned the skeleton with the other. It often took 10 or 15 minutes to clean and stabilize a single square inch. Every half hour one of the workmen had to help me out of the pit so I could hobble about and restore my blocked circulation.



Eroding for thousands of years, the Colossi of Memnon—made in the image of Amenophis III—have fared better than the beliefs that helped shape them. Imagine the impact on Egypt's faithful when foreigners and their alien deities conquered the land of the pharaohs, whose power emanated from the gods. Such defeats must have dealt concussive blows to the Egyptians' worldview and to their belief in the inviolate link between this world and the world to come.

HOW DID THE HUMAN bones and skulls get tossed into the pit? I have a theory. Let's imagine that ancient thieves entered KV 5 and stole objects from Chamber 2. Most likely a human mummy had been buried there in a wooden coffin. The pit is too narrow for a stone sarcophagus, and we've found traces of wood. Hastily they hacked through the coffin and the mummy's wrappings, searching for gold, jewelry, and amulets.

Later robbers removed whatever treasures still lay deep inside the tomb. Somewhere they discovered at least three more mummies and dragged them into Chambers 1 and 2, where light streaming through the front door made it easier to see as they hacked heads from torsos, tossed the skulls into the pit, tore away bandages to rip out the amulets placed across the torsos, and then left the remains scattered over the floor.

To find out if the skulls and skeleton belong to Ramses' sons, we'll need to run DNA analyses. X-rays and other tests will tell us their age at death, cause of death, ailments, and injuries—the parts of life no hieroglyphic texts ever discuss. The main problem will be finding tissue samples to compare with our material. The chances of getting uncontaminated samples from the mummy of Ramses II are almost nil. None were taken before the mummy was shipped to Paris in 1976, where it was treated with radiation and chemicals to protect it from bacteriological damage.

One solution would be to compare the DNA results from each of the four skulls. If closely related, then almost certainly they are Ramses' sons. Another possibility would be to analyze tissue from the mummy of Merneptah, one of Ramses' sons and his successor.

Just before shutting down for the season, we removed the three skulls from the pit but left the skeleton in place. At some point we'll have him x-rayed, but for now, as Ahmed Mahmoud Hassan, our excavation foreman, said, "We can let him sleep."



We have collected so much material from KV 5 that it will take us years to analyze it all. There are fragments of plaster reliefs to compare with decorations in other tombs, pottery to reconstruct and date, and bones to identify and test. As a general rule, one day's work in the field generates three or four days' work in the laboratory, library, computer room, and office.

At the end of the 1997-98 field season, my wife, Susan, and I sat on the Amoun Hotel balcony, watching the sunbirds take a final flight before settling in for the night. It was our last evening in Thebes, and as the sun set, one of our workmen called from the courtyard below.

"Doctor. Hello, doctor," Nubie said. "Can I come up, doctor? I have some news."

"Of course, Nubie," I called back.

Nubie climbed the stairs to our balcony. "My wife had our new baby last night." He looked at Susan. "We named her Jasmine, but whenever you are here, we will call her Susan in your honor."

Ahmed Hassan and several of the hotel staff heard our laughter and came up to offer their congratulations.

Ahmed turned to me. "It is good, isn't it, doctor? There are problems, but then we remember that we have family and friends, and sometimes God blesses us even more with babies. And our work is going well, and when you return I am sure we will find many wonderful things in KV 5." He paused, then looked at me and smiled. "God is great! Life is very nice here in our village, doctor. Don't you think so?" □

For more Egyptian mysteries join our online forum at *www.nationalgeographic.com/media/ngm/9809/.*



a nation savors freedom

ROMANIA'S

Buoyant spirits have the run of Opera Square in Timişoara, where in 1989 demonstrators



new DaY

ignited a revolution ending Romania's dark decades of communist dictatorship.

GYPSY JAMBOREE

Grins are contagious as Gypsies congregate in western Walachia for a three-day festival honoring St. Gregory. Old gold coins—once subject to confiscation—are now flaunted as jewelry. The country's Gypsy, or Roma, population is Europe's largest. Kept as slaves until 1864, the Roma still suffer persecution, stereotyped as itinerant thieves.



GOING WESTERN

Star-spangled shirt and a Bucharest bus ad reflect the Americanization of Romania's capital, where National Basketball Association games are telecast live. The country turned from a command economy toward Western-style capitalism after the '89 revolution, which climaxed with the Christmas Day execution of 24-year leader Nicolae Ceauşescu and his wife, Elena.

By ED VULLIAMY

Photographs by ALEXANDRA AVAKIAN

IT WAS NEW YEAR'S DAY, 1990, a week after the execution of Nicolae Ceauşescu, the communist dictator of Romania, and it had taken those snowy days to subdue the stench of gun smoke and scorched masonry that hung in the air. To walk through the battered national art museum in Bucharest, formerly the royal palace, was to witness an extraordinary moment in history—the beginning of the end of communism in Europe.

A scene of destruction presented itself on the cobbled square below: flower-strewn tanks grinding over charred debris, nervous soldiers and crowds come to gawk, celebrate, or mourn their dead at makeshift shrines.

Codruţa Cruceanu, 33, the museum's curator of European painting and sculpture and an expert on Flemish painting, walked with me through one of the galleries. Canvases were laid out around us like corpses. "The secret police



Embers of the old order glow in Bucharest as trade unionists demand government protection from unrestrained free enterprise. Emblem of the old order survives in the hulking House of the People, now called the Palace of Parliament (right, at top). One of the world's largest buildings at three and a half million square feet, it is widely despised as a monument to Ceauşescu's megalomania. Apartments built for the communist elite now bear billboard ads.

ED VULLIAMY, a correspondent for the *Guardian*, won numerous British press awards for his coverage of the wars in the former Yugoslavia. He is the author of *Seasons in Hell, Understanding Bosnia's War.* Manhattan-born photographer ALEXANDRA AVAKIAN is recognized for her documentation of social and political change, from the breakup of the Soviet Union to life in Haiti. Her article on the Gaza Strip appeared in the September 1996 GEOGRAPHIC.




Samsung
ACEDALIA



Sleek and chic, sisters Mariana and Ramona Sabau personify the increasingly elegant look of Bucharest's young people. Women had mostly done without Western fashions and cosmetics after Ceauşescu restricted their import; few dared risk arrest by buying on the black market.

came in through the Italian Renaissance," Codruţa said, describing her curious experience of the revolution. "Our army entered through the medieval Romanian collection. You can see the damage done here in the 19th-century national school."

Back then, covering events in Romania for my newspaper in Britain, I watched the battle between insurgent Romanian army units and the remnants of Ceauşescu's secret police rage around the museum for three days. Fires threatened to spread throughout the building. Codruţa's colleagues did what they could to rescue the paintings. Some were saved, others ripped to shreds.

We strolled on, stepping through the incinerated remains of museum catalogs lying across the parquet like autumn leaves. At the end of the gallery was a piano, intact but covered with dust. Codruţa lifted the lid and played a few notes. "It still works," she said with a lambent smile. "So you see, there is hope."

Romania was the first Eastern European country to mount a successful armed insurrection against communist tyranny, if not actually the first to shed communism. But in the years since Ceauşescu's fall, hope has sometimes worn thin: The corrupt power of his elite was so entrenched that real change has come painfully slowly.

Impatience led to another power shift in 1996, the year I returned to Romania for NATIONAL GEOGRAPHIC. Against the predictions of pollsters, Emil Constantinescu, a university professor with no loyalties to the communist regime, was elected president. Inheriting an economy in shreds and one of the highest infant-mortality rates in Europe, he has had a difficult start. Last year, as the government continued to remove price controls, the economy shrank by 6.6 percent and inflation reached more than 150 percent.

Romania today is an odd juxtaposition of antiquity and modernity. The almost medieval



Catching amusements however they can, two homeless boys watch cartoons through the window of a Bucharest appliance store. Ceauşescu's policy of encouraging large families through limits on birth control increased Romania's population of abandoned children.

ways of the countryside entwine with the black, heavy industry of the communist era and now the icons of Western capitalism, as the Cold War gives way to a cola war between Coke and Pepsi. Another tension President Constantinescu and his reformers must contend with derives from the people themselves—a mosaic including Romanians, Hungarians, Roma (Gypsies), a few remaining Germans, and fishermen in the Danube Delta who speak Romanian but are ethnic Ukrainians (map, page 45). Judging from other post-communist countries of Eastern Europe, nationalist fervor is a potentially dangerous force.

ONE THING the government hopes to increase is the number of tourists on the trail of Dracula, the most famous ethnic Romanian and something of a national hero. Bram Stoker's vampire was a literary enhancement of a real-life prince known to his enemies as Vlad Ţepeş—Vlad the Impaler. His father was Vlad Dracul (*dracul* means dragon or devil), so he took the name Vlad Dracula, son of Dracul. Among his skewered victims were tens of thousands of invading Turks in the winter of 1461. Dracula was born in the fortified town of Sighişoara, a medieval Germanic city in the region of Transylvania. With its pointed fairy-tale towers, steep streets winding through arches, and stubborn ramparts rising toward a summit, Sighişoara looks the part.

On a pretty square in Sighişoara's old town center, windows are decorated with lace curtains and elegant ironwork, but their panes are vibrating to new sounds along the cobbled alleyways: the thundering of a monotonous song, "Wannabe," by the Spice Girls. It comes from the Boema café, where new red parasols sprout on the terrace and a patron wears a T-shirt with the slogan I Love Free. Something is moving across Dracula country these days, and it has nothing to do with vampires.

"Coca-Cola Welcomes You to Mediaş" proclaims a huge billboard at the entrance to the town of Mediaş, one of Transylvania's industrial hubs. In the center of town, what was once the Communist Party House of Culture, now the community center, is hopping with adolescents, their white shirts made luminous by ultraviolet lighting, dancing to music you'd hear anywhere else on the planet, which can never be too loud.

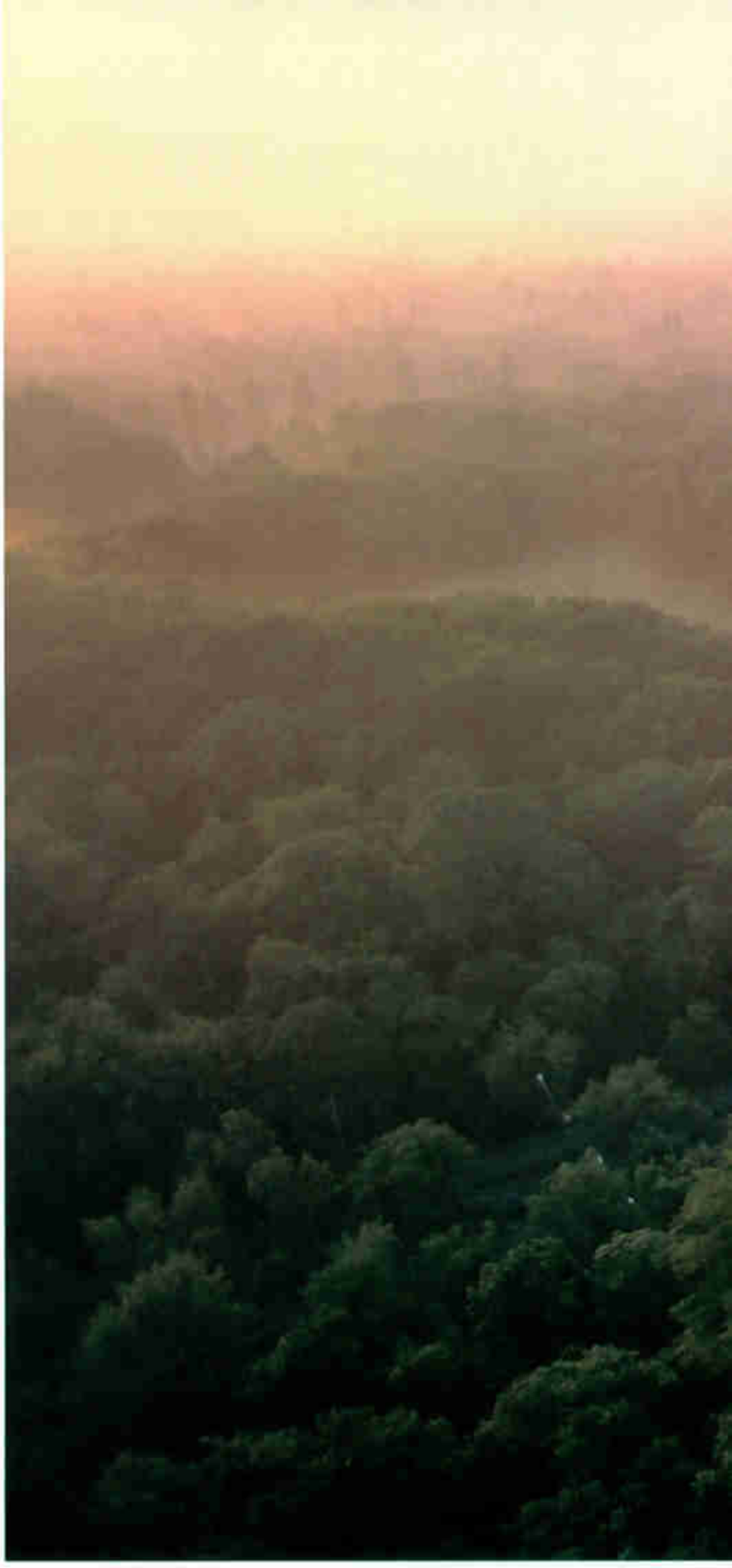
But about 45 miles to the south, in the harsh Lotru Mountains, little has changed since communism, or long before it. This is the season of the exodus of the sheep, streaming across mountain meadows, the valleys ringing with the call of the shepherds. Winter hits suddenly and cruelly in Transylvania, and the sheep are on the move in their hundreds of thousands to quarter in the temperate climes of the Danube Delta. Traffic in villages can be held up for hours by flocks following the road down the valley.

I meet Mircea Costache and old Nicolae Anghel, guiding their flock of 300 sheep up a mountain track for one last night at their summer camp, just as a freezing rain is turning to snow. It feels too cold for September, but the men wear sheepskins over their shoulders and boots wrapped in plastic bags. Mircea, carrying a trusty stick, explains that Dobrin, a scraggy old sheep-turning dog named after a famous Romanian soccer player, is his favorite.

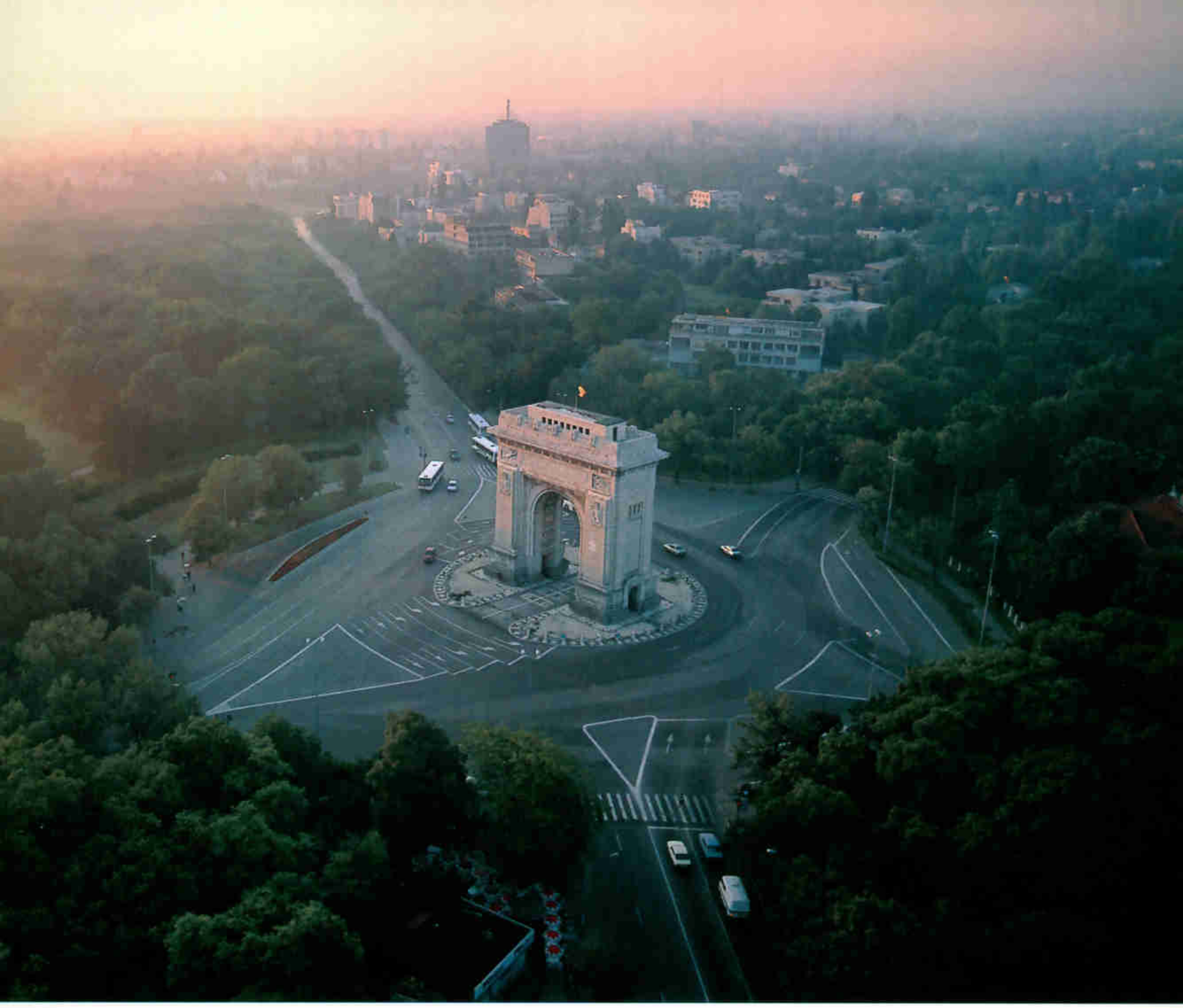
Bears are trouble, Mircea says. "If the bear kills a sheep by the neck, we eat the sheep. But if it takes out the intestines, it's bad luck to eat it. The bear is king of the mountains, but the wolf is their devil. No one knows where he lives, and he is the most intelligent of all of us."

As we enter a thick forest, there is a sudden howl. But this is no wolf, just old Nicolae, the worse for vodka, giving his dog, Ciobanica, a furious hiding. The sheep move through the forest in silence, spectral in the mist. Finally we pass the tree line, out through driving snow onto a barren expanse where the wind bites and the horizon is lost. Mircea's description is apt: "Here we go through the edge and out into the empty."

Despite the vodka Nicolae has not lost his shepherd's sixth sense. Two animals have gone astray. He lets out a terrifying stream of curses: "*Du-te dracului!*—Go to the devil!" and flings



A touch of France flavors Bucharest in the Arcul de Triumf, inspired by the Arc de Triomphe. Dedicated to Romania's soldiers, it exemplified this "Paris of the East," a sobriquet less apt after the 1947 communist takeover sapped its élan. The country's name reflects its history as a Roman province; centuries of invasions followed. Principalities of Moldavia and Walachia formed by the 14th century, but Turks held sway into the mid-1800s. In 1918 Transylvania joined the nation. Current borders were set after World War II.



UKRAINE
MOLDOVA
48°
Satu Mare
Baia Mare
Strîmtura
Botiza
7,556 ft
2,303 m
Carpathian Mts.
Vatra Moldoviţei
Suceava
Prut
MOLDAVIA
Iaşi
HUNGARY
Oradea
Cluj-Napoca
Piatra Neamţ
Bacău
Siret
TRANSYLVANIA
Arad
Copşa Mică
Sighişoara
Mediaş
Mureş
ROMANIA
Timişoara
Sibiu
Şureanu Mts.
Lotru Mts.
Braşov
Petroşani
Transylvanian Alps
Dracula's Castle
Vulcan
Galaţi
Brăila
Tulcea
Danube River Delta
Black Sea
Buzău
Ploieşti
Belgrade*
Drobeta-Turnu Severin
Piteşti
WALACHIA
Ciofliceni
Bucharest
Jiu
Argeş
Craiova
Vlădiceasca
CANAL
Constanţa
YUGOSLAVIA
44°N
Danube
Olt
Giurgiu
20°E
24°
BULGARIA
28°
Atlantic Ocean
North Sea
EUROPE
0 mi 500
0 km 500
Black Sea
ROMANIA
Mediterranean Sea
UKRAINE
Black Sea
ETHNIC DISTRIBUTION
Romanian 89.4%
Hungarian 7.1%
Roma (Gypsy) 1.8%
German 0.4 %
Ukrainian 0.3%
Other 1.0%
0 mi 50
0 km 50
NATIONAL GEOGRAPHIC MAPS

an empty vodka bottle into the mist. "He is telling the God of the sheep's mother to go to hell," explains Mircea calmly. Soon the sheep are retrieved.

Now 28, Mircea lost his job as a tractor mechanic on a state farm after the revolution. To earn enough to care for his mother, he took to the hills to learn the biblical craft. His salary of $30 a month is low even by Romanian standards—the average wage is $120—but at least it's steady. "It gets lonely up here," he says, staring down at the lake below us. "I would like to see the many wonders I have never seen"—he mentions America—"but if none of these things happen, then that is what God has decided for me; that is my curse, I accept it and shall stay with the mountains."

At last we reach a small wooden cabin surrounded by squelching mud and manure and a company of pigs and turkeys. Inside, the scene calls to mind one of Codruța Cruceanu's Flemish paintings. Above the fire, whose embers illuminate only a small part of the interior space, blackened buckets hang by hooks and chains from a beam. People are sleeping under mounds of sheepskin blankets. From one of these hunched shapes comes a reedy female voice, issuing an instruction. In response a young woman emerges from the darkness and sits cross-legged by the fire, where she chops a log with a vintage ax. Then she blows the embers to life and stirs the brew in a bucket hanging above the flame. The fire is a blessing, for by now the cold and wet have penetrated skin and flesh, freezing our bones.

The habitation comes slowly to life. The girl is Irina Bara, 16, daughter of the flock's owner, Dumitru Bara. Others in his team of five shepherds emerge through the door from outside. The woman whose command had initiated the evening meal is Maria, Dumitru's wife, who now ladles warm yogurt into metal bowls. Eaten with steaming polenta, it is rich, creamy, and delicious.

In the old days, in theory at least, sheep were as much part of the state-controlled agriculture system as any other animal. But peasants like Dumitru managed to keep a few head of sheep of their own, especially in these wild mountains. Now Dumitru is free to own as many sheep as he wants. In summer they roam state-owned pasture, and in winter he grazes them on land in the warmer delta for which he pays rent—an outgoing he says he can ill afford since the prices for wool are low in comparison with those charged for food and other essentials. "A kilo of wool for a beer," he says, adding that under communism the price of beer was so low that a kilo of wool would have bought not only beer but a meal as well. Under communism, a shepherd reminds him, we wouldn't have been allowed to have this conversation.

Dumitru nods his agreement, but the look on his face suggests that he's still as preoccupied with the price index as he is welcoming toward freedom of speech. In the old Romania these mountains were overseen by Ceaușescu's son, Nicu, who allowed a favored few, including Dumitru, to trade items such as cheese and wool privately. And so for some people the new order has come at a cost.

After supper, hanging onto every calorie of heat from the merciful fire and yogurt, I join the shepherds, who must spend the night outside as sentries against marauding wolves. We lay our sheepskins on the frozen ground. "We'll all die here," Nicolae Anghel grumbles.

Sleep comes, and when first light opens my eyelids, which are covered with snow, the shepherds are already milking the sheep for what Dumitru says will be the last time until next spring. "We start for the plains today," he announces.

The packing up begins—trucks will arrive that afternoon to move the supplies. The shepherds, Dumitru, and the sheep will make the journey on foot. I set off with them for the first mile; then we say our good-byes under a quickening in the eastern sky as the sun bursts through.

FROM THE SHEPHERDS' WATCH, my way led west to the Şureanu Mountains, then south through hamlets of loggers and their fires, past hydroelectric dams that rise like cliffs from the rushing water below. No more than a track of jagged rocks, the path then plunges into the valley of the Jiu River, Romania's coal-mining heartland.

The revolution of 1989 is only beginning to touch what has long been one of the most important industries, and the blackest of them all. The slow pace of political change has helped perpetuate an archaic industrial landscape. In heavy industry, by and large, an old communist

ORPHANAGES: UP FROM SQUALOR

Hair shaved to combat head lice, children play on the grounds of a Bucharest institute for the handicapped. Indoors, physical therapist Elena Radulescu works the legs of Gabriel Chiran, who is partly paralyzed below the waist. The glare of coverage by a newly unfettered press after the revolution exposed the shame of Romania: neglected children living miserable lives in ill-equipped and filthy orphanages. Donations of money and staff from a host of local and international organizations are helping make improvements.



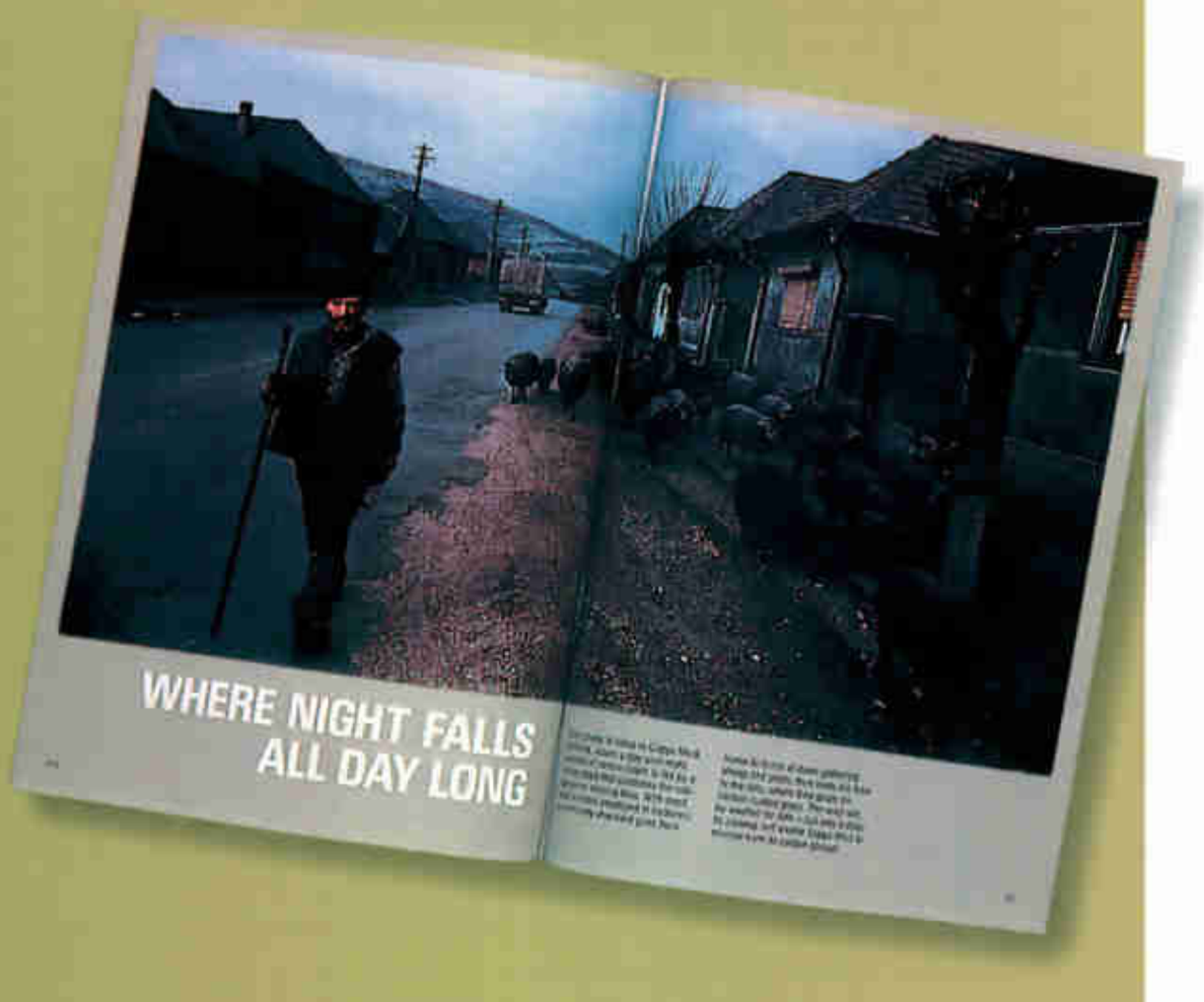
THE PAINTED WORD

Pious devotion guides a nun at Moldoviţa, a Romanian Orthodox Church convent built in 1532 near Vatra Moldoviţei. Artwork depicted historical sagas and biblical tales for the illiterate faithful. Though communist authorities did not ban religion, they restricted worship, sometimes persecuting believers. Flagging church attendance rebounded after the regime's collapse.

LIFTING THE DARKNESS



Freshly cut peonies, a clean shirt, and a white house signal a partial victory against pollution in the notoriously fouled town of Copşa Mică. A June 1991 National Geographic *article on Eastern Europe's poisoned environment spotlighted the central Romanian town's plight. A producer of*



carbon black for use in tire manufacturing, the town's Carbosin plant belched thick clouds of particulates into the air. White sheep had black coats, vegetation was stunted, houses wore thick layers of grime, and clothing had to be dried indoors.

The carbon plant was part of Ceauşescu's grandiose and heavy-handed plan to transform Romania from an agrarian country into an industrial dynamo. Although the plant has been closed and the air is visibly clearer, another offending factory, Sometra, remains (left, at top right). Housing lead and zinc smelters, it spews pollutants that irritate the throat and cause respiratory ailments, anemia, abdominal pain, and—some suspect—premature births and deformed babies.

economy has hung on long after the people spoke out—and it shows.

Petroşani, the cultural center of the Jiu River Valley, presents a comfortless skyline under a battleship gray sky. The city consists overwhelmingly of coal shafts and drab apartment blocks. None has a chimney: Home fires, I was told, were banned under communism so that miners would not be tempted to steal coal. The coal miner, the brawniest and most long-suffering of workers, always held a special place in communist iconography, and union bosses were prominent figures in the party apparatus. Six months after the 1989 Christmas uprising, Ion Iliescu, Constantinescu's predecessor, summoned miners from the Jiu to Bucharest. With crowbars and chains, they cracked the skulls of students demonstrating for democratic change, killing at least one and *wounding* scores of others. The man who led the miners was Miron Cozma.

At union headquarters in Petroşani, the entrance to which is flanked by two imposing black statues of miners in the angular socialist-realist style, Cozma showered me with gifts, including his book about St. Varvara, the patron saint of miners, and a tape dedicated to him by a heavy-metal rock band.

"We are more powerful than any political party," Cozma said, speaking of the tens of thousands of miners who make up the union he heads. When the conversation finally gets round to the batons and chains of Bucharest, he said, "I regret that very much. We were manipulated by those in power." (Cozma has since been arrested for the role he played in similar violence in 1991, though he continues to head the union.)

Ilie Martin, then the director of the Vulcan Mining Complex down the road, was less cautious in describing his motives. "We were the working-class police."

The descent into the Vulcan mine, a place populated by blackened faces and bright but distant eyes, begins in a crude iron cage. At the bottom rusty boxcars stand at the end of two tracks that disappear into the gloom of a low tunnel. "Do you smell anything?" asks Gheorghe Ile, the mine's technical director. "It's gas." If you lit a match in here, the mine could explode.

We continue along rotting wooden planks partly submerged in coal mud and water, our

way lit only by our helmet lamps. Soon we're crouching, walking like apes, bumping our helmets against the roof beams. We descend into a tiny shaft down wooden steps, then a wooden ladder whose rungs are intermittent. At the bottom of a steep scree we enter a narrow gallery, which, after 500 yards, turns sharply into another. We squeeze through a hole and find ourselves in a damp tube. "We are at the coal face," Gheorghe announces.

Squatting among the wooden props that support the low ceiling, pickax in hand, is Marton Kato, eyes gleaming from his blackened face. "Hard to say which is worse," he says, "the work, or where we do it. But the danger is worse than either." There have been fatal cave-ins and explosions in this mine—indeed there was a cave-in on the day of my visit, but no one was hurt. But safety has improved, Miron Cozma told me: In 1971, for example, 103 men in his union's mines died; in 1985, 63. The average now is about 20 a year.

Kato is 30 but looks twice that. He and his co-worker Nicuşor Butnariu, 24, have been working down here for five years. "You have to be fit—physically fit, psychologically fit," Butnariu says. "Never think about the surface, or your wife, or what you may do tonight. If the coal falls, the door closes. That's it."

The old guard had little interest in making enemies of what they still regarded as the "mass base" of its ideology—the workers in heavy industry—by streamlining the mines. Miron Cozma had pledged to protect the job of every miner but conceded, "I cannot assure work for the miners' children."

Then in the summer of 1997, soon after miners in the Jiu went on strike successfully for a pay increase, the government offered a severance package to miners who would voluntarily quit. The number of takers—about 15,000—reflects deep concerns about the industry's future. How these men will earn a living once they have run through their severance money remains unanswered.

Coal mining is something of a metaphor for Romania's problems. Constantinescu's hope is that Romania will play its products on the global roulette wheel of the free market. But recent efforts to convert government operations into real businesses may still leave Romania operating on the edges of commercial Europe, to which it passionately wants to belong.

DRIVING THROUGH the Romanian landscape, it is easy to get lulled by the lyrical, pastoral countryside, with horses and carts plodding along the roadside, slowing things to the rhythm of older times. Then you turn a corner and behold what Romanians proudly call a "chemical platform," or some such dark satanic mill, which gives you a blast of sulfur dioxide. As you approach Bucharest, noxious punctuations become more frequent.

But the drab boulevards that lead into the city have, since 1989, sprung those first buds of primitive capitalism and free expression that can be seen all over Eastern Europe: kiosks selling soda, chewing gum, candies, newspapers, and pornographic magazines. All around, people are out strolling, frequenting the new cafés. Hard currency brought in by foreigners, a source of money banned to ordinary Romanians under communism, fuels some of this activity, and whatever hardships the aboveboard economy is suffering in the shift to capitalism, that which operates underground—notably prostitution and gambling—is thriving.

One way to start getting to know Bucharest is to visit the previously forbidden corridors of the palace Nicolae Ceauşescu was building when he was deposed, now home to Romania's parliament. Rising out of the cityscape through a sickly haze of morning sunshine and traffic fumes, this enormous white wedding cake of stone is one of the largest buildings in the world. Ceauşescu destroyed much of old Bucharest to build the palace and Union Boulevard—the grand street leading to it—as well as luxury apartments for his party faithful and the great piazza where he intended crowds to gather and adore him. Nine years ago it was forbidden to drive up what was then called Victory of Socialism Boulevard; now it's a mayhem of traffic, gesticulating police, and neon lights.

"It could only have been built by a dictator," says Radu Cimponeriu, administrator of the sprawling labyrinth of carved marble. "Yes, it is rather large," says Maria Atonache, one of 122 cleaning ladies who work the building. "But you get used to it. I clean here for eight hours a day, then get home and clean the house. Mind you, that only takes half an hour. It's a bit smaller."

THE ROOTED AND THE RESTLESS

Restarting from scratch, Tudora Margarit, 59, plans to raise corn on her once and future farm. In 1988 communist authorities seized her land and belongings and bulldozed her house into a pit. Under a restitution program she has regained much of her property.

A slaughtered sheep (below) helps provision a Gypsy festival. Ordered to settle in villages in the 1950s, the Roma still travel during summers, engaging in horse-trading and metalcrafts.

CASTLE DRACULA

Swirling mists cast an eerie pall over the ruins of Vlad Dracula's castle. Born in Transylvania, he reigned as a prince here in the region of Walachia. Though not a blood drinker like the fictional vampire, the 15th-century ruler was bloodthirsty—earning the epithet "the impaler" for skewering Turks and other enemies on stakes.



rustic ways live on

Pockets of traditional lifestyles endured when unmolested either by collectivism or by Ceauşescu's crash urbanization scheme. In traditional dress for her wedding day, Maria Mihnea (above) poses with her parents and brother beside their barn in the village of Strîmtura as they await the groom's arrival. Near Botiza shepherds lunch on freshly made sheep cheese. After mountain grazing in summer, sheep are driven to lower elevations, and roadways countrywide fill with a roiling, baaing migration.



Ceauşescu never fulfilled the fantasy around which the building was erected: to stand on the great balcony above the piazza, with half a million Romanians paying homage below. But years after Ceauşescu's death, throngs finally came to the palace to cheer. It was September 13, 1996, a Friday evening, and they gathered in good time, streams of young people, mostly girls, as the late sun caught the fountains. A spotlight was trained on the balcony, and to a crescendo of music and screaming, nearly two hours late, Michael Jackson walked out. He waved, mumbled something indecipherable about loving everybody, blew a kiss, and disappeared. Appearance time: 27 seconds. But there was no sense of disappointment. Romanians were tasting the forbidden fruit of Western decadence—and finding it sweet.

Police then cleared the streets, until the only children remaining, as on any other night in Bucharest, were those who lived there.

THE SCANDAL of Romania's street children is the legacy of the revolution's single most unforgettable revelation to the outside world: the prison camp orphanages in which infant waifs—starving, filthy, often dying from AIDS—were discovered chained to cots. A flood of Western money went to alleviate this suffering, and the orphanages accordingly improved, some beyond recognition.

So now a knock on the door of the Pinocchio orphanage, a name given because of its child-friendliness, is answered by Sorina Chivoiu, who talks about "getting some kind of modern social service mentality rooted in this country." The institution, run now not by the state but by the elected Bucharest city authorities, is clean, its walls lined with children's pictures. Nevertheless the word orphanage is a politeness—in reality, this place is a dumping ground.

Sorina points out Radu, a five-year-old with a cheeky grin. He was found at the age of two at a Bucharest railway station, where his father had left him with a note round his neck, "abandoned by mother." "It took two and a half years to identify him," says Sorina.

About 100,000 children live in institutions in Romania, but many of those abandoned by their families do not. "Most orphans end up being adopted by the street," says George Roman, an organizer for Save the Children, whose volunteers scour a subterranean demimonde in search of abandoned children who live rough, trying to rescue those who appear unable to survive.

In a New Year's address after his election, President Constantinescu said he wanted to draw people's attention to what is still Romania's sad reality. Numbers are hard to determine, but children's groups estimate that some 4,300 youths now live as street children, mostly in Bucharest. The country has the highest number of pediatric AIDS cases in Europe; during the communist era, clinics reused hypodermic needles when administering vaccinations against childhood diseases, and blood used in transfusions was sometimes contaminated. There is also a high incidence of AIDS among children born or made homeless after 1989, says Miralena Mamina, the Bucharest program coordinator for Save the Children. "It is because of their sexual activities," she says—a euphemism for child prostitution.

Where there is evil, there are usually angels too. Just past the midnight hour, when Anca Dionisie, 24, a volunteer for Save the Children, strides into the forecourt of Bucharest's main train station, children rush toward her, their miserable world illuminated. Ruffling their matted hair, she cuddles them, even kisses their sores. "I have no politics or religion," she says. "I just work against any world that thinks children can be thrown on a garbage dump and treats them as though they are guilty of something."

Anca says to me, "Come, I want you to meet some interesting people." We journey through the cold, rainy, foggy night to a new drive-through McDonald's—a shining altar of change. She lifts a manhole cover in front of the building. Through the opening in the tarmac comes a jet of hot, putrid air, into which we descend down a long ladder set into the concrete shaft. It takes awhile to become used to the darkness, but the light of scattered candles slowly reveals a nether scene straight out of Dostoyevsky. Huddled in corners of a brick chamber or perched asleep on coughing heat pipes are children, about 15 of them.

Anca introduces Laurenţiu, a leader of this group. "I've been on the street for 12 years, but things are different here," he says. "Most of these children have lived up at the station

and have come here to try and change their ways. Our rules are that if you steal, you're out. If you sell your body to the foreigners, you're out." At 22, Laurenţiu—weary and wearing a cross around his neck—is no child, but the others range in age from 8 to 17. Most live by begging, but a boy called Carl, 14, has found a regular job loading goods at the railway. At about seven each evening, he returns "home."

This little community is barely hanging on, as 17-year-old Florentina, sitting up in the car park, demonstrates. Florentina has deep eyes and sharply sculptured cheekbones, yet her natural beauty is marred by the sores on her face, which is as red as boiled lobster. Before speaking, she fixes a plastic bag full of warm glue to her mouth and inhales. "A man wanted to have sex with me," she says. "I was afraid to go with him, so he raped me. I didn't want to go home. Here they leave me alone."

As Florentina's eyes glaze over, Laurenţiu's voice comes from the depths beneath the manhole. "Florentina! Come out of the rain!"

THE LIGHT of a quicksilver moon dances on the turquoise water of the swimming pool. At an outdoor party in a Bucharest setting that Laurenţiu and the others can only dream about, the selection of drinks is estimable—including tequila for the toast to our gracious host, Vijai Gill, head of Pepsi-Cola, Romania.

"That was a great day when we launched Pepsi Max," says Vijai. "Music, thousands of teenagers, and the president of the company over from the U.S. When they opened the sampling booth, we nearly had a riot on our hands. I remember a woman of 60 fighting through the crowd to get a can of Pepsi Max."

Most of Vijai's guests are expatriates working for Western companies. They seem little impressed by the first signs of Romanian privatization—"the old guard selling industries to themselves," an Italian financial consultant says. There is reason enough for suspicion. For instance, the Păunescu family, a weighty dynasty under Ceauşescu, bought the franchise for the Bucharest Inter-Continental Hotel, and the state banking industry has been weakened by a series of scandals allegedly involving massive fraudulent loans by directors to themselves.

One guest is Radu Florescu, son of a historian of Dracula (the real one). Florescu heads the Romanian branch of the Saatchi & Saatchi advertising agency, handling the accounts of Kent cigarettes and Hewlett Packard, among others. "Brand names mean something here," says Florescu. "Take detergent. People will buy a box of Ariel, then Bona, a cheaper local brand, after that. But they'll still pour the Bona into the old Ariel box so visitors will think they're using Western soap powder."

As the commercial landscape begins to change, however slowly, something dramatic is happening in villages such as Vlădiceasca and Ciofliceni. During the 1980s these rural settlements disappeared, literally, plowed into the ground on Ceauşescu's orders. And where they stood, grain was planted, as the communist regime chased productivity targets set by the "cultural revolution" on which Ceauşescu embarked after a visit to China.

The peasants in these villages were wrenched from the confiscated land their ancestors had farmed for generations, forced by the authorities into drab high-rise apartments, and left to languish. One of the earliest—and most convincing—indications of Romania's emergence from communism came in 1991 when Ion Iliescu's government decreed that the peasants could take back their land, albeit without compensation. Many have returned from state farms and high-rises to the land where they and their forefathers had scratched out a living.

Outside the village of Ciofliceni, a heartening sound is coming from the place where, on February 27, 1988, Gheorghe and Ioana Paun's house was razed. It is the banging of a hammer, as Gheorghe rebuilds the barn where his cows and pigs will pass the winter, the Pauns' first back home.

"They did it bit by bit," says Ioana, describing how the local authorities forced them out. "First they wanted our orchard, then our garden. They gave us 36 hours to leave the house. We watched them dig a big hole, pull everything down, including the curtains, and bulldoze it all into the hole."

The apartment building—a nondescript slab, now empty—to which the family was moved "was not even ready," says Ioana. "There was no roof or water or electricity."

Gheorghe was given a job in a local factory,



Dawn's glow silhouettes ferryboat passengers in the Danube Delta, one of Europe's largest wetlands and the target of a belated pollution cleanup. Ceauşescu ordered huge swaths of the delta diked for farmland, another misadventure being reversed as Romania sets sail on a new course.

and every day the bus took him past the field where his house had stood. "It was wonderful to come back," says Ioana. "We had lost touch with our neighbors—but here we are, neighbors again."

The Pauns' two acres or so are planted with tomatoes, cabbages, grapevines, and eggplants. Their new house, made of mud bricks, plaster, and straw, took four years to build; it is neat, with whitewashed walls. But, says Ioana, producing photographs, "It's not the same as the old house is it?" She pauses. "But it's the land that matters. I like to work the land, that's what I was born for."

WHILE THE NEW ROMANIA has brought Ioana Paun back to her scrap of land, upon which she says she will die "a happy woman," for many Romanians changes have had the opposite effect. The new world is a broader one, made of distant, calling horizons.

In the days after the 1989 revolution when I was in the art museum with Codruţa Cruceanu, the expert in Flemish painting, there had been a joke at my expense. I'd asked Codruţa if she'd ever been to Flanders. "The very fact that you ask such a question," she scolded, "shows how little you understand what communist Romania was like." Until then, Romania had been a country in which every typewriter was registered with the police, and it was forbidden even to talk to foreigners without government permission.

Six years later we walked down the same corridor in the museum, which had been restored. Codruţa was now the head of publications and works on international projects. The building glistened. Early morning sunshine stroked the square below, crowded with people in brightly colored clothes. Now it seemed fair to ask, "Have you been to Flanders since the revolution?" "Many times," she replied. "And I'm off to Italy tomorrow." □

SLOW AND SPOOKY, an 11-foot shark cruises past a submerged ice ledge where seals often rest. Never before photographed beneath Arctic ice, the Greenland shark, whose scientific name, *Somniosus microcephalus,* means "small-headed sleeper," has eluded close study until now.

Greenland

Sharks

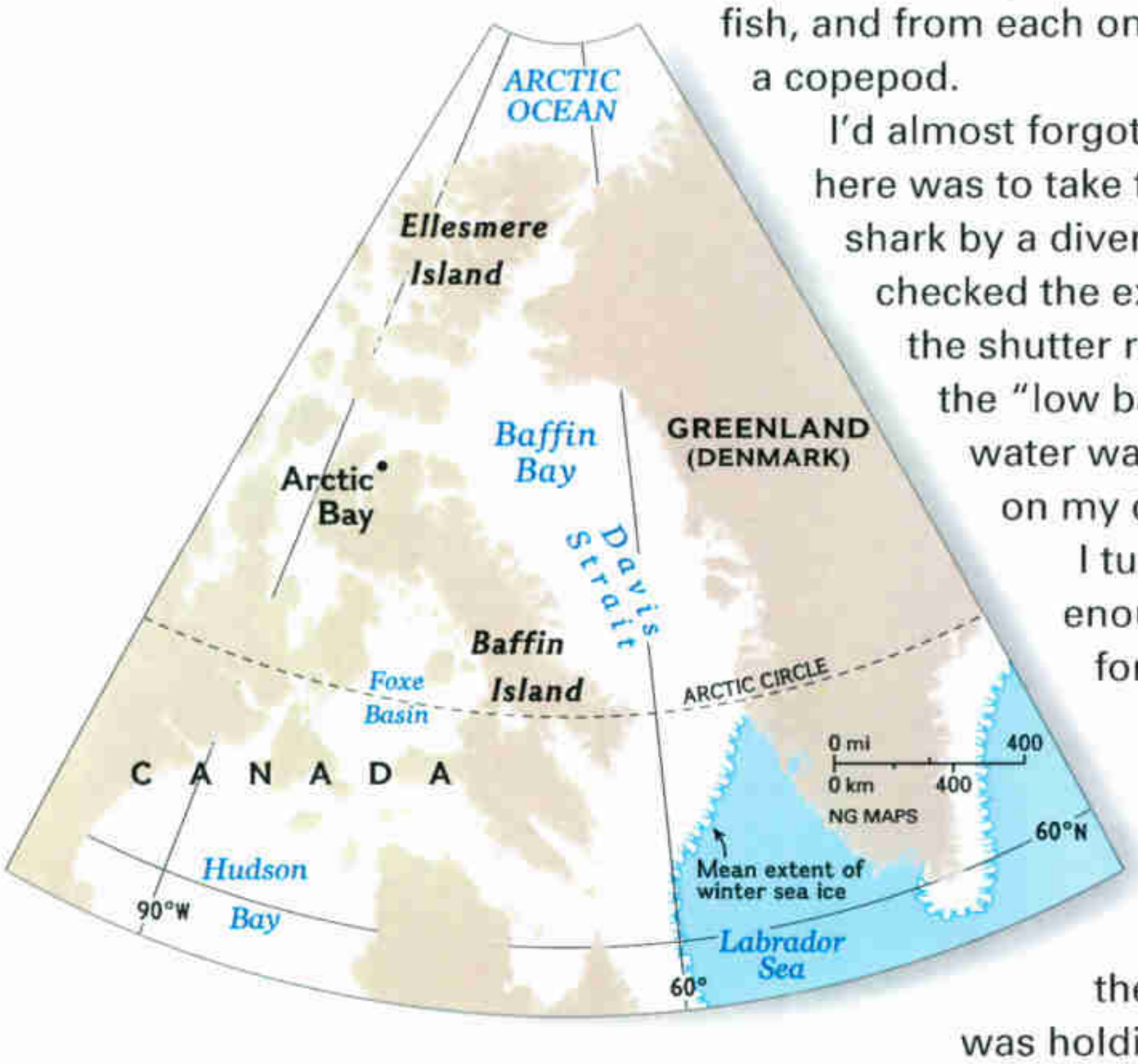
Article and photographs
by NICK CALOYIANIS

I SWAM THROUGH A FRIGID CONSTELLATION of tiny plankton, swirling around me in a half-lit universe beneath the surface at Arctic Bay. I'd been down there nearly two hours—far too long, even in a special cold-water dry suit. My fingers were numb. On the verge of hypothermia, I was feeling lightheaded. It was time to go topside. I'd spent two long August weeks on Baffin Island in northern Canada, waiting for a seemingly endless string of storms to pass so I could go diving. I was in search of one elusive creature: the Greenland shark, the only shark hardy enough to live in these 28°F waters. My trip was nearly over, and now, bitterly disappointed, I had to give up and go home.

"It rose up and hovered near me in an almost vertical position," says diver Clarita Berger. "When I saw its mouth starting to open, I got concerned." But there is no record of Greenland sharks ever attacking humans, and a nudge with a strobe light sent this one into retreat.

But wait . . . was I hallucinating? A dull outline formed in the murky distance. It was a long animal. Huge. My diminished senses perceived it to be a narwhal, without its unicorn-like tusk.

Forget the cold. I kicked my fins and swam toward the shadowy figure. It turned and began moving toward me. I was face-to-face with a Greenland shark. I'd seen drawings and paintings of the fish, but this was utterly different. It was ghoulish. Its nostrils were the largest I had ever seen on a shark. They reminded me of a giant double-barreled shotgun. Its mouth was slightly open, revealing rows of small sharp teeth. Its eyes looked fogged over, like those of a dead fish, and from each one dangled a tasseled parasite called a copepod.



I'd almost forgotten that my sole reason for being here was to take the first images ever of the Greenland shark by a diver. I quickly aimed my camera, focused, checked the exposure, and then gently depressed the shutter release. But there was no click. Instead, the "low battery" indicator was blinking. The cold water was taking its toll not just on me but also on my camera's lithium power source.

I turned the camera off in hopes that enough energy remained in the system for the exhausted battery to recover. The shark then headed over to a mesh bag of bait I'd placed nearby and sucked it in like a big gray pool vac. I couldn't believe this. I was staring at the one thing I wanted the most, and now a ten-dollar battery was holding me back. A minute passed. I switched the camera back on. Power! Enough for two shots. The shark showed renewed interest in me. Afraid it would suck me into its menacing maw, I backpedaled furiously toward the surface.

"I found the shark!" I yelled to a colleague on the shore.

This expedition was over. But, my hasty photographic efforts aside, I still wanted to document fully this eerie predator in its underwater lair. And so the following spring, accompanied by noted shark parasitologist George Benz of the Tennessee Aquarium—and toting lots of fresh batteries—I returned to the Arctic, now covered by ice.

We waited. But not for long.

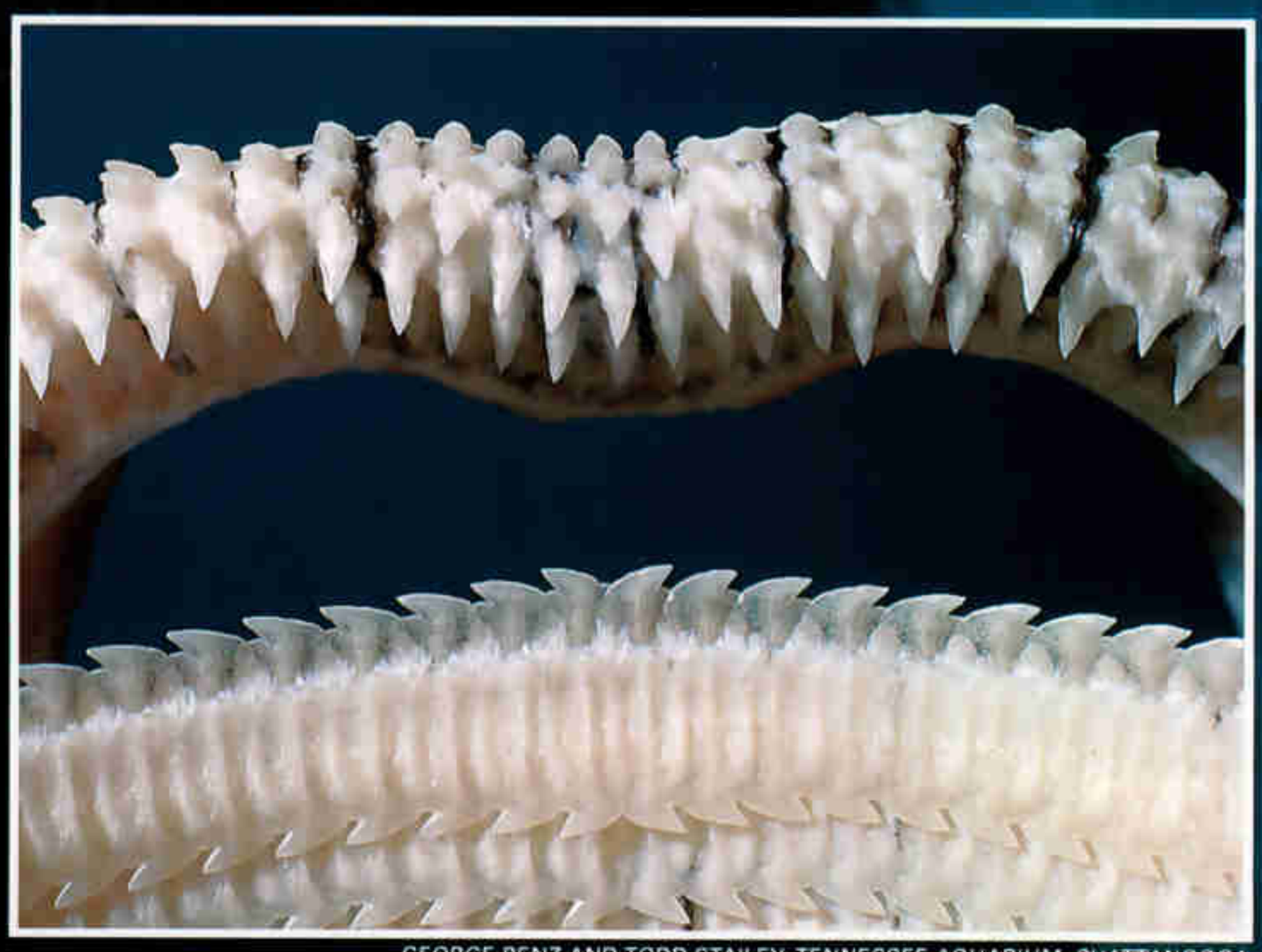
Filmmaker and photographer NICK CALOYIANIS documented mating nurse sharks for the May 1995 issue. He lives in Baltimore, Maryland.





The Business End

A SERRATED lower jaw slices through prey held in place by the dagger-like upper teeth (right). Rather than losing one lower tooth at a time, the entire array drops out and a new band shifts forward. The lethargic shark eats seals, fish, and carrion, sometimes by opening wide and sucking in its prey. "We lured one with a three-foot mesh bag of bait," says author Caloyianis. "The shark inhaled it from three feet away."



GEORGE BENZ AND TODD STAILEY, TENNESSEE AQUARIUM, CHATTANOOGA





Dine at Your Own Risk

"DRUNK AS A DOG," the Inuit like to say. The phrase comes from the behavior of sled dogs after they eat the raw flesh of Greenland sharks, which often contains a strong neurotoxin.

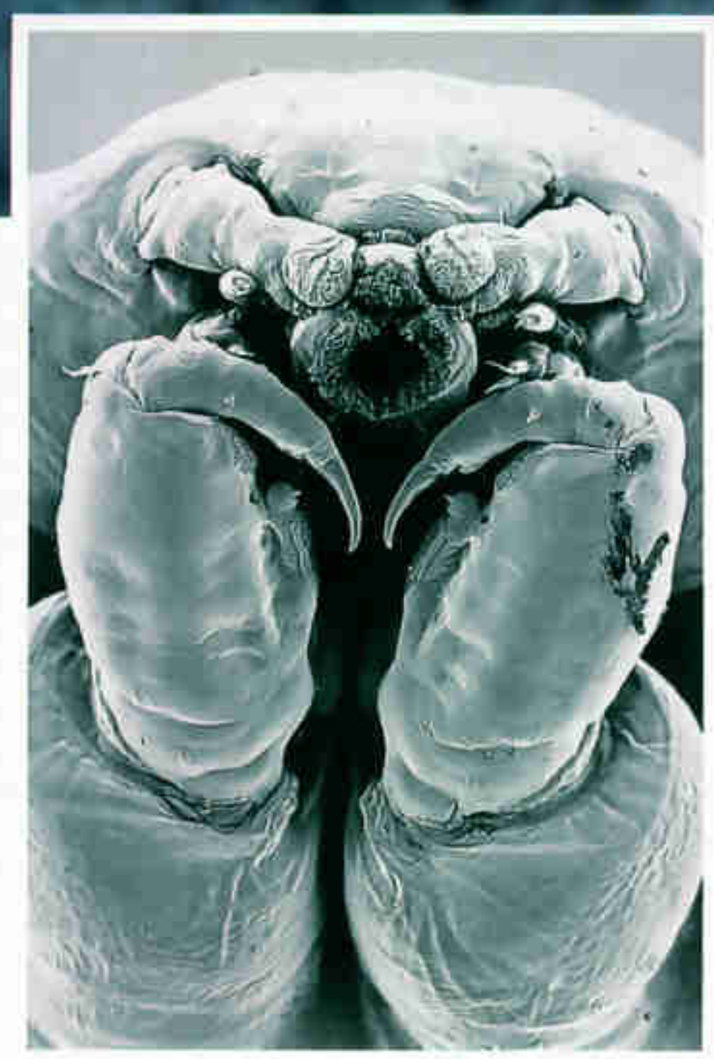
One of the few ways to detoxify the flesh is to soak a dead shark in salt water for several days—an approach tried by researchers who then fed the carcass to a team of hungry sled dogs (above). They showed no adverse symptoms.

"We later saw a dog that had fed on a newly killed Greenland shark," says Caloyianis. "It appeared inebriated. It couldn't stand up."

Poisonous flesh doesn't stop Greenland sharks from cannibalizing each other, as marine biologist George Benz (left, in white) observed when his research team pulled in two sharks they had hooked through a hole in the ice. One was devoured up to its head.

Among the world's largest sharks, the Greenland is nevertheless among the least studied. Records show a 21-foot-long female caught in 1895 off the east coast of Scotland, but Arctic specimens measured on the ice (below) reached only 7 to 11 feet. There are no reliable data on life span, but fully grown Greenland sharks have been recaptured 16 years after being tagged.



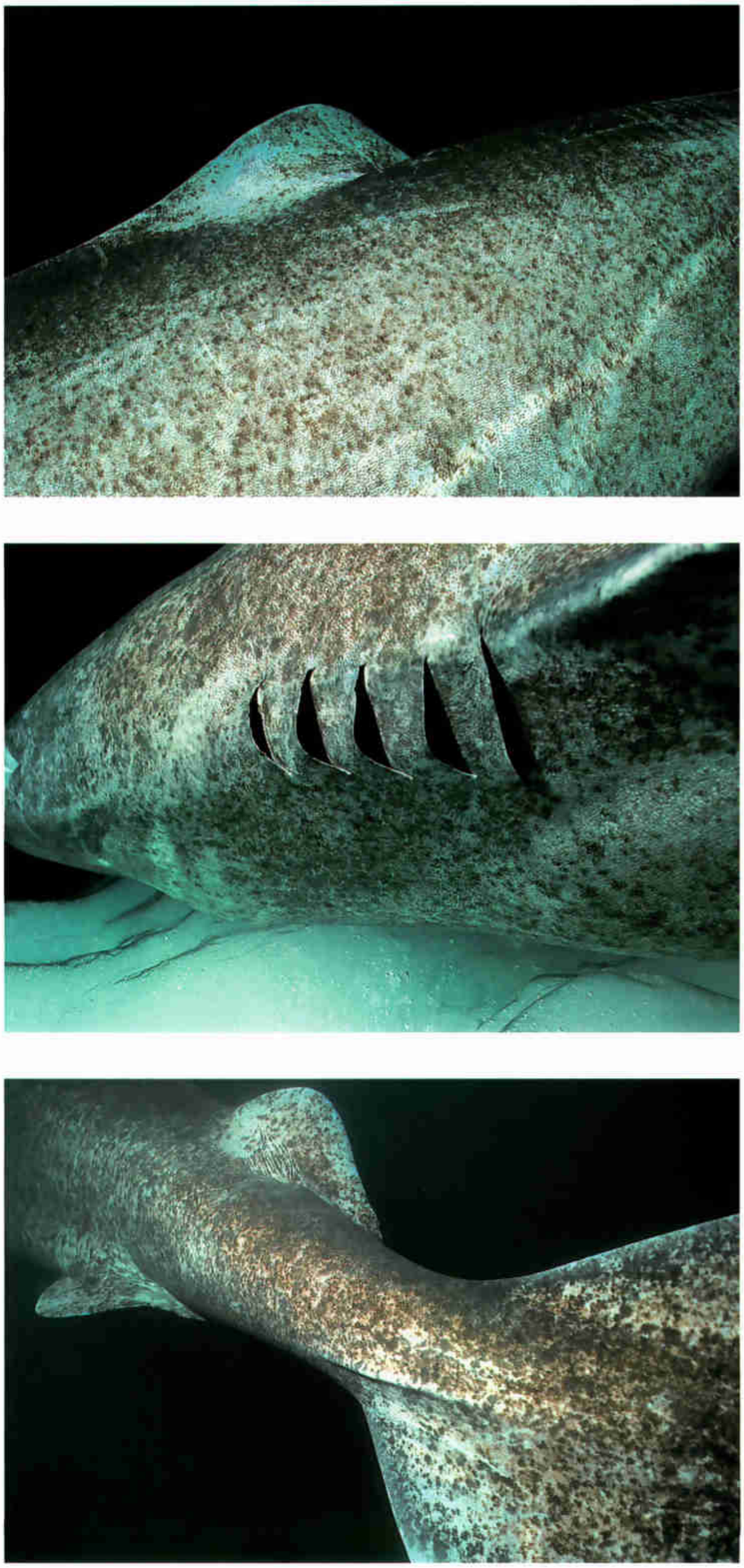


JEFFREY BRASWELL, DUPONT

have little use for eyes.

Scientists speculate that the copepod may actually aid the shark in feeding. Fish may be attracted to the parasite, which moves like a fishing lure when the shark is swimming.

Although the shark's vision is severely compromised, it retains a keen sense of smell to seek out prey.



No Frills Fish

TETHERED for close observation, a Greenland shark heads for the depths moments before it is released (right). Well adapted to life in frigid, dark waters of the Arctic and Atlantic, the seemingly primitive Greenland shark probably evolved from an ancient deep-water species.

Its dorsal fin (left) is far less pronounced than those of more active sharks, including some of its dogfish kin. The shark's gill slits (center) are smaller than those on most other sharks; they may boost suction for feeding. The author was surprised to find a horizontal ridge called a caudal keel—usually found on faster swimming sharks—on its tail (bottom). This led experts to think he had discovered a new species until Benz found a reference to the keel in a decades-old text.

During World War II the Greenland shark was hunted for its liver oil—valued as an airplane engine lubricant.

Its tissues have a high urea content, giving rise to the Inuit legend of the shark's origin: An old woman washed her hair in urine and dried it with a cloth. The cloth blew into the sea and became the first Greenland shark.

Today the Inuit disdain this curious creature, which they consider a useless nuisance that scavenges their food. □

Losing Sight to a Parasite

TURNING A BLIND EYE to hitchhikers, almost all Greenland sharks host tiny crustaceans called copepods that attach themselves to the sharks' corneas, severely damaging their eyesight.

Magnified under an electron microscope (bottom right), the three-inch invertebrate exhibits two clawlike appendages that grasp the cornea.

The anchoring process creates a scar, and additional lesions occur as the copepod's body scrapes back and forth across the cornea while the parasite feeds on surface-layer cells. Before long, the abraded cornea fogs over.

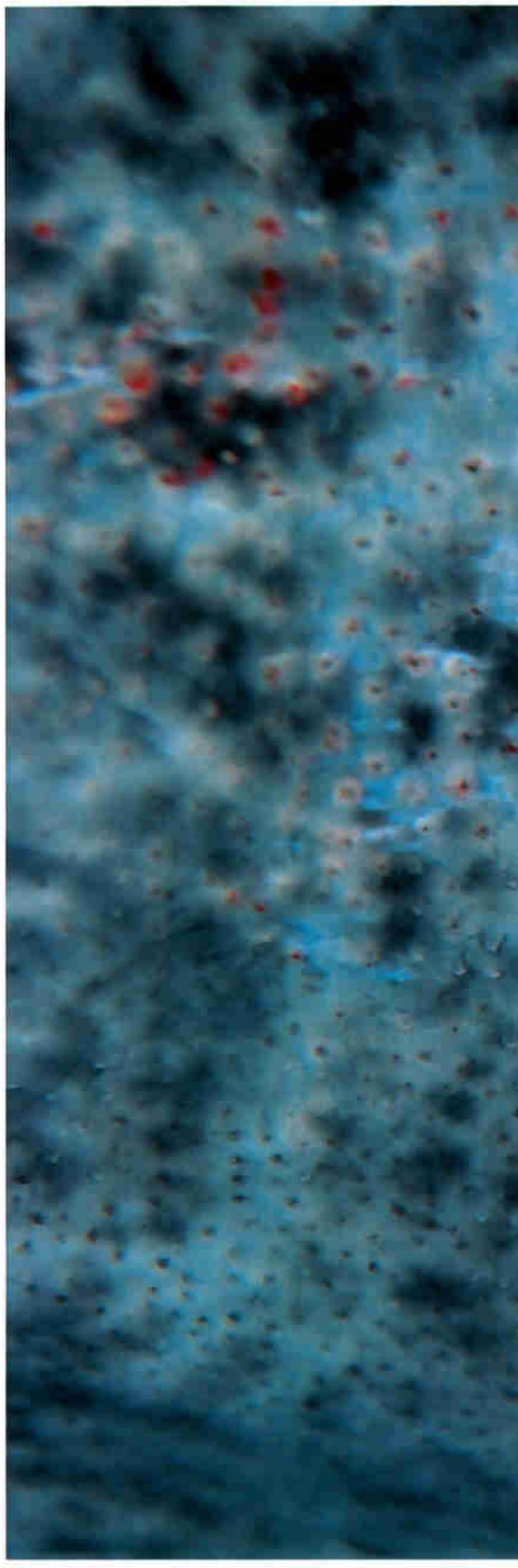


Dangling like a worm (top right), a copepod trailing an egg sac clings to a Greenland shark's eye. The fish's pupil can be seen behind the clouded cornea.

"The shark's eye still moves about," says Caloyianis. "The lens itself at least seems to stay functional."

In a lens removed from a Greenland shark (above left), researcher Benz's inverted image is clearly visible, leading him to believe the shark could detect light.

In any case, because they spend most of their time in darkness, sometimes at ocean depths reaching 7,200 feet, these sharks seem to





By EDWARD HOAGLAND
Photographs by MICHAEL YAMASHITA

The same picket fence that lets spring in can't shut winter out in Vermont's Northeast Kingdom. Winter rules here, but the rest of the seasons make up in splendor for what they lack in length. "At times there's a luxury in the beauty, and at other times an austerity," says a local poet. "But it's always there."



VERMONT
Suite of Seasons



Sunlit frost paints a windowpane in the author's empty house. There's no electricity, no central heat, and, for much of the year, no one to notice.

SUTTON

Rain-washed and windswept, sumac brightens as it nears peak season. Once used as a simple dye, these leaves still color the countryside each autumn.

JAY PEAK







"OUR NORTHEAST KINGDOM" was originally Senator George Aiken's phrase, referring to the least assimilated corner of his state of Vermont, lying next to the Quebec border and the headwaters of the Connecticut River in northern New Hampshire. In fact the springs on my own hundred acres in Caledonia County flow into Canada and the St. Lawrence River, but if I walk a couple of miles through the forest, I'll find running water that heads toward New Hampshire and south to Long Island Sound.



In Essex County there are bog-and-forest townships with fewer human beings than I have fingers, and in my sprier days I've climbed its mountains—Gore and Stone and West and Seneca and Starr and Bull—camping on top with my white collie mongrel, Bimbo, and a brown hiking goat named Higgins. We three visited Maidstone Lake and South America Pond, the Yellow Bogs, Ferdinand Bog, and the forks of the Nulhegan River, Victory Basin, the Moose River, and lovely Paul Stream, though the paper companies have since logged these places heavily. Oddly enough, wild woods and backwoods towns are now associated with innocence and restfulness, a hideaway in which to "recharge," whereas they used to be regarded as benighted, incestuous, or brutal.

My own little Wheeler Mountain, scarfed and skirted with clouds, looks off southeastward to the massif of the White Mountains, clustering about Mount Washington, 70 miles away; and west to the gentler north-south spine of the Green Mountains—Camels Hump, Mount Mansfield, Jay Peak—or to a vista of the Sutton Mountains in Quebec. A 45-minute scramble rightward from my front door brings me up to the bare granite pitch where these sights are at hand. But if I veer left from my house into the fern gardens and tangle of behemoth blowdowns under a tall fir woods, I come to juicier spruces surrounding a small fen of succulent swamp bushes and grasses and birches and poplars, with curling trickles that feed into it from groundwater seeps in the ledges above. This sanctuary is where a cow moose gives birth to a calf every spring, and tracks regularly show that a bear family has ambled down from the ridgetop to drink from the stream and paw the windfalls for ants or nip off vegetation. In a sandy wallow I'll find black hairs floating in the turbid water, as if the bears have just jumped out. In a nearby maple and beechwood flat I was once challenged by the mama, after she'd put her cubs up a tree. She kept bluffing me, lumbering at me several times, chopping her jaws, but when I stood still (loyal Bimbo next to my thigh), she broke off, brought them down again, and shepherded them off.

That was the same walk when, earlier, I'd found a 19th-century apothecary's bottle, with raised lettering on the glass, in an old cellar hole and stuck it in the crotch of a big tree for safekeeping, sure that I'd find it again—but, of course, never have. Jack-in-the-pulpits grow near that cellar hole and pitcher plants in a boggy sort of catchment a stiff climb up, near where a coyote family dens, which my neighbor and I listen to at dusk when he plays his harmonica. The coyote pair or the bear could kill a newborn moose calf, but the special virtue of this swampy cul-de-sac is that it's so ripe with moosewood, Solomon's seal, wood sorrel, bearberry, willow shrubs, and all sorts of other stuff the mother moose eats that she doesn't wander far. Then after a month, when the calf is sturdy, she brings it on a path past my house, migrating to a big valley (called Big Valley) where other moose hang out.

I tend to hang out near my pond ("earth's eye," as Thoreau called his), with its green and pickerel frogs, its woodcock in the alder thickets hunting worms, its kingfishers and goshawks swinging through for an occasional meal, and the bull moose that descends and soaks himself on hot days. Or I'll climb to an open-faced shallow cave, shaped like a band shell, in a wild little notch overhead, with a sky's eye view overlooking a deer path, and lie like a mountain lion on the sandy floor,

Essayist and novelist EDWARD HOAGLAND has had a farmhouse in Vermont for 29 years. MICHAEL YAMASHITA last photographed the cycle of the seasons for his book *In the Japanese Garden* (Starwood, 1991).



Sugar maples shade a quiet country road on the Gonyaw farm. Each year Alice Gonyaw makes sweet, amber syrup in this 1,800-tree orchard, just as her father did, and his father. For Alice these trees mark the seasons, and when the sap flows, "that's a sure sign of spring."

sheltered by the undergrowth and forest all around—maybe sometime real lions will be able to return. The summer gets so green that when you close your eyes, the cedars, hop hornbeams, and mossy patterns on the ground remain imprinted inside. The tentative dawn, with skating, humid clouds and spates of rain in squalls, then a sky blue that lifts everybody's heart are wonderful enough but only accompany the welter of oak, apple, and bigtooth aspen greens, and pasture roses, purple vetch, mallow flowers, and brown-eyed Susans. Everything is moving, fattening, the plants in the wind, animals on their own four limbs, in this interval of extraordinary surplus when berries fall and simply feed the worms.

The fall as it waxes cuts crisply into this bounty. The barn swallows leave at the end of August, heading for South America even before the insects they feed on have disappeared. The birds had preempted the sound waves from the frogs during May; then insects took over the main singing duties in August. But all fall silent when the first killing frost lies knife colored on the fields, come morning, as the summer creatures hug the ground underneath for some relict warmth. Mammals, however, just fluff their fur, and deer get in rut. Mammals don't fly or breed in profligate numbers, so they make much less noise and tend to accomplish their courtship or territorial behavior with scent marks and body language. Silence is the mammalian mode, unless they lose their heads like a bugling buck.

During hunting season any surplus deer will be forced off the hill into the buzz saw of road traffic and close-set homes with bow-and-arrow enthusiasts peering out the windows, and the coyotes get to feast. Ten or twelve deer in the particular herd I'm familiar with generally survive, and they gather openly when the gunfire ends, as if taking stock and bonding again—as they'll do four months later, when the ordeal of winter weather ends (the rest of us, like the mythical bear, have been sucking our paws for nourishment).

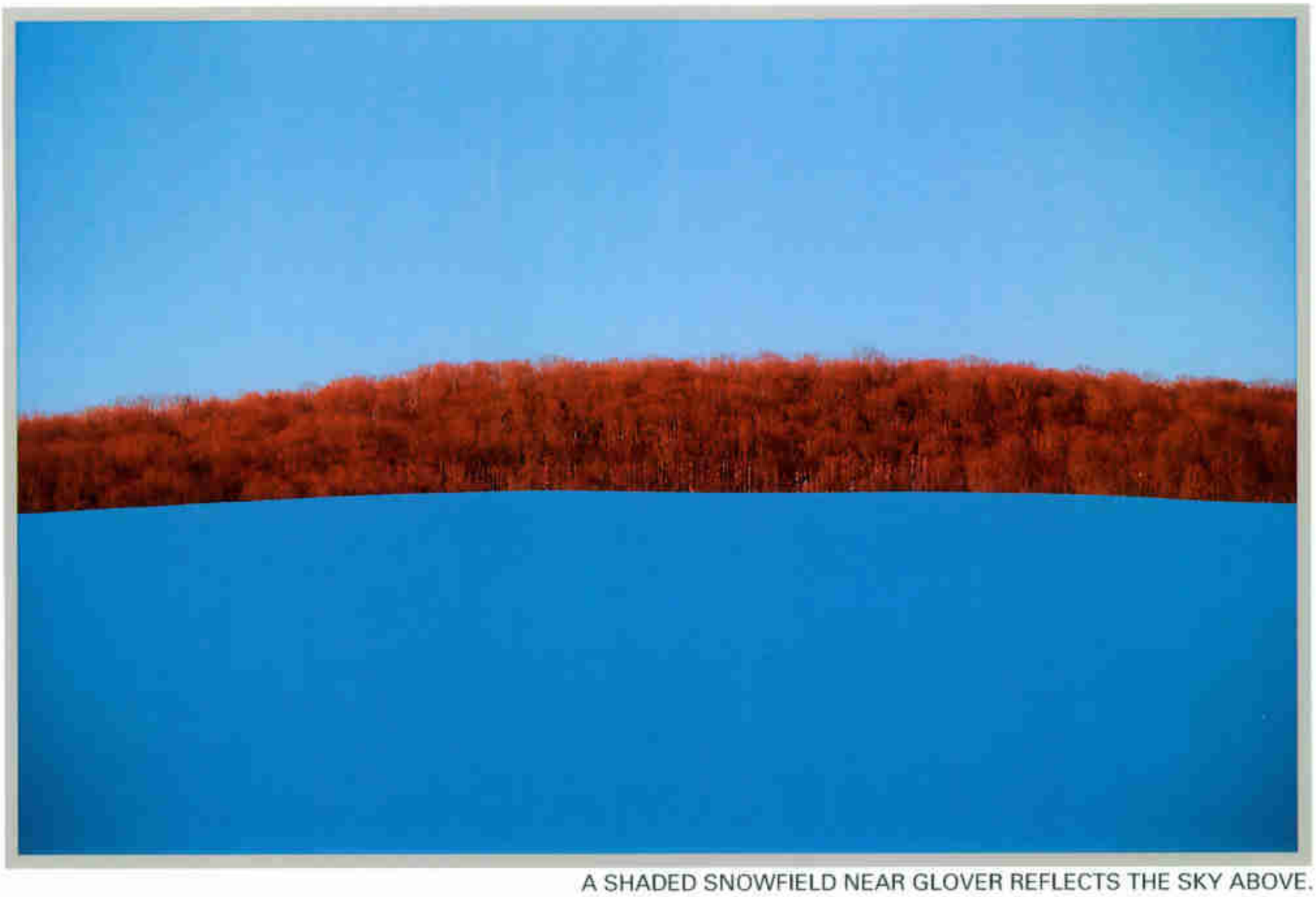
WINTER defines how much wildlife "raw land," as the farmers call it, can carry. When winter shuts in, the food supply crashes, and many denizens, such as bears, chipmunks, groundhogs, jumping mice, and reptiles, go underground, or else fly south. The snowplow and woodpile become talismans, like the interplay of light off steep angles of white, gray, black, or softwood green, and the endless off-white mounds of snow, ambiguous as a surplice, may look chaste or corpse-like, funereal or energizing: Is it for a wedding or a death? Snow slows life, grinds a bit out of you, probably forever, and Vermonters call themselves "woodchucks" because they've learned to hibernate under the weight of it instead of fighting for primacy, as

Gilded by spring's outlaws, a 30-acre field surrenders to dandelions each

NEAR WEST DANVILLE

THE CUTTING FARM, IRASBURG

May. In October motley autumn invades the neighboring White Mountains.



A SHADED SNOWFIELD NEAR GLOVER REFLECTS THE SKY ABOVE.

newcomers do. It puts a damper on some of the extravagances of sunnier climes, the doubled-up bankruptcies, divorces, and such.

Life is piebald in New England, like the fields in the spring and fall—part warm earth and part ice and snow. The deer may be staggering from malnutrition by the time the snipes come back to winnow in lariat loops in their courtship flight across the evening sky, and the whickering woodcocks begin stunting too, in funneling spirals, as the ravens and owls, year-round residents, chime in.

Though Vermont is a small state, its moist, loping terrain, full of choppy mountains and meadowy woods, supports a scrimmage of wildlife in pocket habitats. Killdeers, turkeys, turkey vultures, great blue herons, yellow-throats, rose-breasted grosbeaks, broad-winged and red-tailed hawks, red bats and hoary bats, smoky shrews and short-tailed shrews, red-bellied snakes and green snakes, spotted salamanders, meadow voles, hairy-tailed moles, and star-nosed moles—what haven't we got in Vermont?

You can set your calendar by when the big snapping turtle crosses my road to lay her eggs every spring. Earlier, the red squirrels had telegraphed when the maple sap started to run by dashing up the trees and nibbling twigs. Then, by and by, the yellow-bellied sapsuckers drilled holes in the bark to lick the sweets, with hungry hummingbirds freeloading behind them. My fox family overlaps with my skunk family and raccoon family in foraging. They gingerly bypass each other in mouse-hunting, grub-eating, berry-gobbling expeditions, grabbing a crippled songbird or an incautious garter snake and devouring it quickly lest the competition horn in. Foxes race and pounce, skunks scuttle and dig, raccoons employ their flexible fingers for cut-purse prying.

The deer and moose, too, overlap throughout the summer in crossing my fields, though the deer, more vulnerable, winter beside the stream low in thick copses that shelter them from the windchill and deep snows, while the moose, longer legged and tall, climb up near the ridgetop to tough it out in less protected places, where their ancient enemy, the wolf, would have a harder go. In the stream, newts and two-lined salamanders also share adjoining habitats. The newts swim judiciously in the slow, greeny amber stretches, while the



GRANITE CLIFFS FLANK LAKE WILLOUGHBY IN WESTMORE.

two-lined salamanders hide under rocks in faster water, limited to a few feet of navigable territory but with more insects to grab, tumbling by.

At the pond, which I had dug a decade ago (the best $110 I've ever spent), already four kinds of frogs breed—green frogs, pickerel frogs, gray tree frogs, and spring peepers. The tree frogs in a June rainstorm will pipe up, safe in their willows after leaving the breeding pool, as if notifying one another where they have ended up. Frog music, in fact, was why I wanted the pond, and I've been careful not to transplant any fish or turtles into it that might eat the eggs. Toads lay eggs there as well, so five kinds of watery songs now enliven the spring dusk for me, not counting the wood frogs' clucking calls, which briefly in April resound from shallower, rain-fed temporary pools. I worry about *them* because their voices have noticeably thinned in the annual songfest, and I come across fewer hopping through the moss in my walks later on. Like the wandering wood turtles—also severely depleted in recent years—you don't see them much in my neck of the woods. Terrestrial turtles everywhere are getting run over as roads crosshatch the places they live. But with the wood frogs, the prime disaster appears to be acid rain; I've done pH tests on the evanescent breeding pools that fill with the spring showers and found that they have become as acidic as tomato juice, whereas the spring-fed, permanent ponds where the other frogs breed are still in the healthy range.

People overlap too. Summer folk pay taxes on lots of land they vacate on Labor Day, whereupon the guy living in a double-wide trailer with a plywood extension built onto it, near town, may come out and make the place his own—collect the cider apples, nail deer stands in the trees, cut balsam boughs to twist into Christmas wreaths, lay out a trapline for beaver, mink, and bobcat, and run some bear hounds through and sell the bear's gallbladder to Korean medicine men.

But after Memorial Day weekend, all seems politically correct on the place again. The defunct farm becomes a stage set for modern morality plays: Repairing a marriage or starting afresh, recapitulating for one's children the pleasures of sunfish fishing, flower pressing, butterfly collecting, rabbit raising, or Orion

"How varied the hues of the brilliantly lit water," wrote poet and native

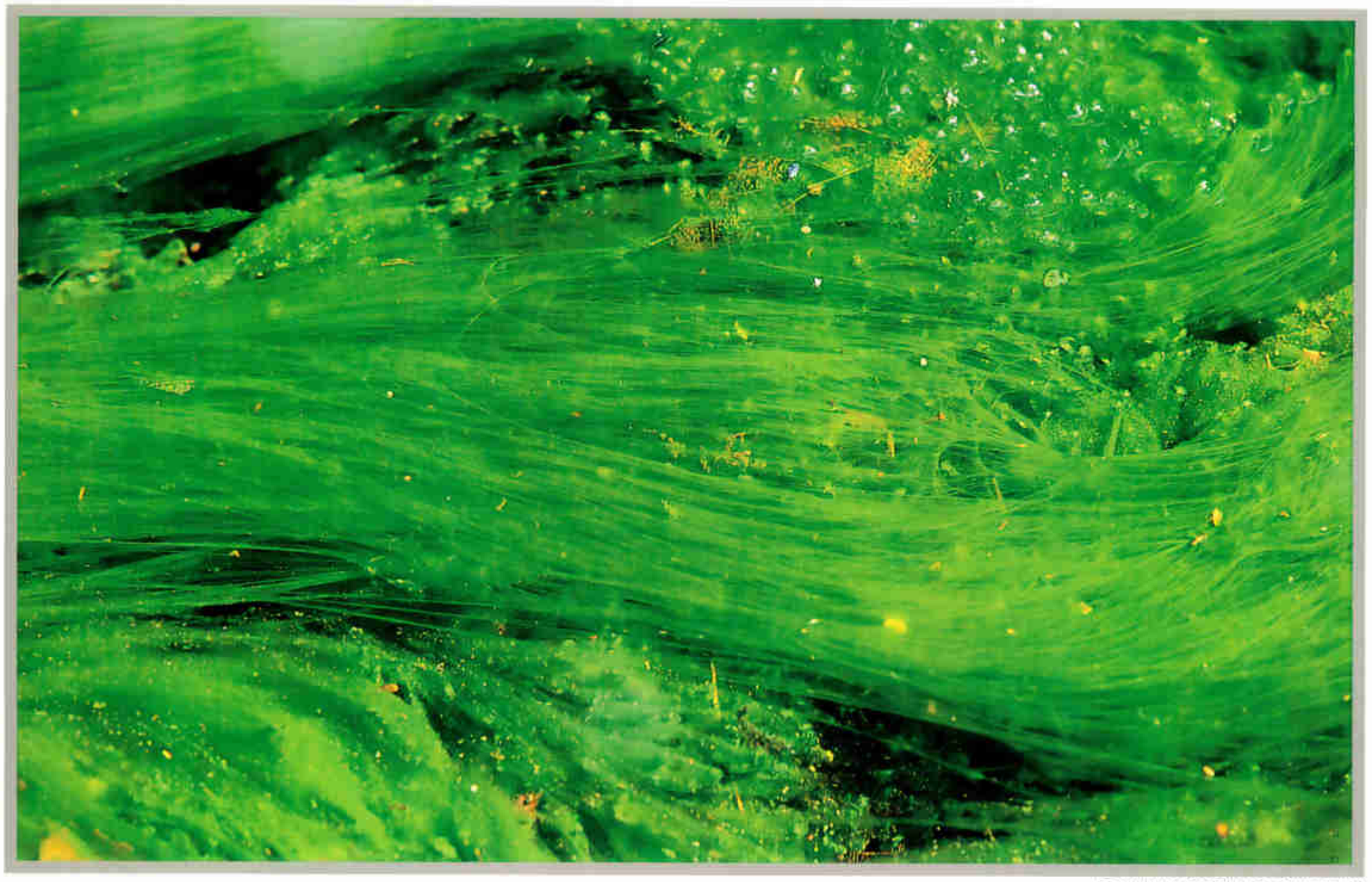


POND BROOK, BARTON



HOLLAND POND, HOLLAND

son Leland Kinsey. "All the rainbow colors . . . into the ultraviolet and infrared."



BOILING SPRING, SUTTON



ALDER BROOK, HARDWICK



PIPELINES CARRY SAP FROM SUGAR MAPLES IN DERBY.

and aurora and star gazing, skinny-dipping, home canning, or whatever else may eventually instill in them a feeling for nature. Or one just holes up in temporary solitude as a tonic because it's stabilizing.

In Vermont we know that the Earth spins when the weather comes on hard, usually layered, never glossy or flagging. Bruise-colored, steel-colored, quilted with thuggish thunderclouds or smothering snow clouds—till it lets go for a while, showing the sunny blue or galactic black beyond. I don't believe one can live fully if one is afraid to die, and I don't meet many Vermonters who are. Being outdoors in all seasons, they take nature for what it is, all-encompassing and yet cyclical, fecund, rhapsodic, but then chilling and killing, until the next year. Though you drive carefully, of course, you don't expect to count as an exception. Like the maple woods, you will turn dramatically orange in the face some fine day, and then quite white and very still.

This is not a spot for high hopes and long horizons: The question is whether that wee snowstorm is going to hit tomorrow, or that broken culvert is finally going to puncture your front tire, or that wet hay is going to decompose and set the barn on fire. Yet the lilacs do bloom every spring; the mama snapping turtle crosses the road at the same point to lay her clutch of eggs in the sandbank again.

Rock-ribbed inertia or faith kept the human Vermonters here too—steaming cedar boughs for liniment oil, digging ginseng roots, trapping fox fur, tracking wild bees to their honey hives, besides the main business of milking cows, churning butter, peddling cottage cheese, logging yellow birch to haul to the mill, maple sugaring, and cutting Christmas trees. My predecessors on this farm did all these things (and sold corn whiskey and lived a lot on deer), improvising to make a go of it, since it was so stony, steep, and cold.

Most creatures—not just us—defend a piece of property for themselves: birds, bullfrogs, bears. Every cherry season I listen to the mother bear that dens nearby defend her cubs' food sources on my land from other bears drawn off the ridgeline by the scent of fallen apples and wild cherries. Growling loudly, she warns them away, much as the coyote family will drive off a bachelor coyote from their rabbit pastures by howling and threatening an attack or a nesting meadow



A SPRAY OF DAIRY BY-PRODUCTS FERTILIZES A FIELD IN CABOT.

mouse will assault another mouse that blunders by. She's paid the property tax on three yards of grass and tolerates no trespassing by her own species, until the weasel finally tracks her down and sucks her throat. Yet the elasticity of the arrangement is such that the land gets layers of use, its mounting undulations hosting whole cycles of flowers, butterflies, the wealth of ostrich ferns, lady ferns, cinnamon ferns, and sensitive ferns; the ash and butternut trees, basswoods, diamond willows, slippery elms, bigtooth aspens, beeches, and hazelnuts; wood thrushes, scarlet tanagers, cedar waxwings, and porcupines.

WHEN YOU DEVOTE time enough to looking at a mountain, it becomes a bit chameleon—clouding over, changing color, its cliffs turning convex or concave according to the slant of the light. The trees are miniaturized, yet you think you know their patterns, the pale patches of quaking aspen and dark green seams of red spruce. But then you realize that your geometry is incomplete: Trees you didn't know about have grabbed a foothold in the interstices of one shoulder or on the brawny, cryptic face. Climbers test their craft on one giddy pitch of Wheeler Mountain, while others use a scrabbly, more forgiving trail to introduce their kids to the gentle sport of scrambling or to lead their friends and spouses up to the same exhilarating end point, where you can gaze across at the White Mountains in New Hampshire or the Sutton Mountains in Quebec. A five-mile glacial lake lies below. The precipice the alpinists practice on is like the blunt forehead of a sperm whale, and its high-sloping, forested back is where the rest of us will hike on balmy Sundays—otherwise a rendezvous point, banded with mists, that coyotes howl from, bobcats scream from, bears and moose and snowshoe hares and red-backed voles shelter on. I never tire of looking at it.

A quarter century ago, I remember, Carl Wheeler, son of the man the mountain is named for, had a heart attack at 84. His wife, Dorothy, called for an ambulance on the CB radio—there are still no phone lines here. Typically for a small town, his nephew came, and as Carl's stretcher was being slid into the back, Carl asked that everybody pause a moment so he could have one last look upward at what he was leaving behind.

A young skier finds freedom in new March snow. "Winter makes us

rugged," says a lifelong resident. That and the gentler seasons make them stay. □

CRAFTSBURY COMMON

Catherine

SHADOWS IN THE SNOW, two women nearing St. Basil's Cathedral evoke the night in 1744 when a 14-year-old German princess, hoping to wed the future tsar, arrived in Moscow with her mother. Resolved "to perish or to reign," the girl became empress — and one of Russia's most controversial reformers.

the Great

By ERLA ZWINGLE
Photographs by SISSE BRIMBERG

SHE WASN'T EVEN RUSSIAN; she was German. She had absolutely no legal claim to the Russian crown. She endured 16 excruciating years waiting for her cruel, mentally subnormal husband to become tsar; six months later she overthrew him in a coup; a week later her guards murdered him. She claimed to espouse the ideals of the European Enlightenment, yet she tightened the grip on the serfs so far that they rebelled in the greatest Russian uprising ever before 1917. Claiming to love peace, she oversaw seven wars and masterminded the complete dismemberment





D. G. LEVITSKY, STATE TRETYAKOV GALLERY, MOSCOW

As alone as this woman seems in St. Petersburg's Palace Square, Catherine (below) for years endured the disdain of her husband, heir to the throne, and the suspicion of his aunt, the empress. In books she found solace and the ideas with which she would try to remake Russia.

of Poland. We'll discuss the lovers later.

Yet Empress Catherine II ruled for 34 years, one of the longest reigns in Russian history, and not long after her death in 1796 a Russian historian wrote to her grandson: "Should we compare all the known epochs of Russian history, virtually all would agree that Catherine's epoch was the happiest for Russian citizens; virtually all would prefer to have lived then than at any other time."

Today judgment is considerably more mixed. There is no single great event that defines Catherine's reign, no epic deed that still excites admiration. Even in her lifetime Catherine had furious critics, who saw her as a bloodstained usurper and opportunist; she also had passionate defenders—foremost among them Voltaire, the French philosopher, whom she manipulated by shameless flattery and lavish presents and who responded by idolizing her and acting as her personal publicist to all of Europe.

The shortest possible summary of her reign would include, on the positive side, her wars with the Turks, which gave Russia the Crimea and access to the Black Sea (map, page 103). She reorganized the municipal system. She was, to some degree, a patron of the arts.

On the negative side, she took over all church property, closing monasteries and turning bishops essentially into state employees; it was a cruel wound to a profoundly pious culture. She created more serfs than ever before. And she drove Russia deep into debt for the first time in its history.

Yet Catherine still has secured a place in the historical imagination. We see her in vague dimensions both as an enlightened monarch struggling to bring Western culture to a backward nation and as a passionate woman either coldly manipulative or tragically thwarted in love. But the more I searched, the more she eluded me. Some of her palaces have been left

to dilapidation, some closed to the public. St. Petersburg's Winter Palace is now the Hermitage Museum, and her private apartments no longer exist. Outside the city, at the crumbling mansion Sliding Hill, the long lawn is now empty of the roller coaster she playfully had installed for summer amusement. The royal compound at Peterhof, where Catherine lived off and on during her reign, is Russia's most popular tourist attraction and has all the intimacy one would expect of a place that draws six million visitors a year.

But I eventually discovered that Catherine's world remains, not the world of diamonds and Cossacks but the taut, baffling world of Russia itself. There is the same desire yet revulsion toward Western culture, a craving for reform, an almost agonized yearning for a benevolent autocrat, and desperate social conditions. Since the fall of communism ordinary people endure much the same grinding struggle to survive, political uncertainty, and sense of lack of control over their own lives as did the serfs of Catherine's day. Catherine would immediately recognize this passionate, irrational, titanic nation hungering for happiness even as it savages those who attempt to provide it. Stripped of its splendor, her world remains, in Alexander Solzhenitsyn's phrase, the "accursed Russian reality."



PRINCESS SOPHIE FRIEDERIKE AUGUSTA of Anhalt-Zerbst was born in Stettin—now part of Poland—on April 21, 1729.* (In those days Bach was still composing masterpieces, and Benjamin Franklin was writing *Poor Richard's Almanack.*) She was the first child of an obscure German prince connected with the Russian royal family. Not beautiful, and obviously not the longed-for boy, she compensated with quick wit and sheer charm. She was also a tomboy, with a naturally optimistic temperament and inexhaustible energy. Yet she suffered deep early scars; her father was distant and cool, and after two brothers arrived before she was five, she watched her mother lavish all her affection on them.

Much worse off in every way was the sickly boy, Duke Karl Peter Ulrich of Holstein-Gottorp, to whom she was engaged at age 15. Ugly and eventually disfigured by smallpox, he was also feebleminded, childish, and sadistic. As the grandson of Peter the Great, however, he would become Tsar Peter III of Russia. "My heart predicted nothing agreeable; only ambition sustained me," Catherine wrote in her memoirs. "I had in my heart a strange certainty that one day I should, by

*All dates are based on the Julian calendar.

ERLA ZWINGLE is a former NATIONAL GEOGRAPHIC editor. Her most recent article for us, "Naples Unabashed," appeared last March. SISSE BRIMBERG, a contributor to the magazine for more than 20 years, has had a lifelong fascination with Catherine the Great.



my own efforts, become Empress of Russia."

Catherine (whose name was changed when she converted to Russian Orthodoxy) arrived in Russia in the winter of 1744. She hated Moscow; it was too chaotic, too barbaric, too Asiatic. It was Mother Moscow, Orthodoxy's sacred bastion after the fall of Constantinople, a wooden city of narrow, muddy streets and a thousand bell towers whose deafening bells clanged almost continuously.

Moscow still isn't the most ingratiating city. Gray haggard buildings cling to the battered boulevards; the air is scorched with traffic fumes. On the eve of the Russian elections,

At ease in the lap of her admiral grandfather, a girl watches graduation at Dzerzhinsky Naval School. Likewise cozy with the military, Catherine wrested the throne from her husband, Peter III, with the backing of guards regiments. Then she kept the troops under constant surveillance. Soldiers who drunkenly railed against the empress were often sent to Siberia.

everyone was talking urgently about the need for reform. If there is a constant thread in Russian history—apart from oppression, war, terror—it is reform. "Being reformed is our normal state of being," said Zhanna, a young artist. "We feel like rabbits under experiments all the time," her husband, Slava, added.

Catherine wanted to be admired as a reformer, and she labored tirelessly on important, but unglamorous, issues: the legal code, schools and orphanages, town planning, agriculture. But her idea of reform didn't go too far: She knew that too much change could put her power at risk. She would not have been at all surprised by the fate of Mikhail Gorbachev, former president of the Soviet Union and a champion of reform. Television reports of his campaign for election in 1996 showed him enduring the bottomless rage of his disillusioned countrymen. "Get out, you Judas," screamed one woman. "You sold out our country!" Explaining to a reporter why Gorbachev's countrymen had turned on him, a professor said simply, "Gorbachev decided to change Russia from a feudal state to a civilized one."

Catherine idolized Peter the Great, who ruled from 1682 to 1725 and was the first leader to radically reform Russia. But he had left her plenty to do; behind the facades of baroque palaces the country remained essentially superstitious, uneducated, and conservative. "People were careful not to talk of art or sciences, because they were ignorant about them," she wrote of the Russian court. "One could bet that half the company could not read, and I am not sure whether even a third could write."

The Russia Catherine first visited was still a world of extreme contrasts. Its magnificent palaces were often shoddy inside and reeked of sewage. She wrote, "It is not unusual to see emerging from an enormous courtyard, deep in sludge and horrors of every sort . . . a superbly dressed woman covered in jewels, in a magnificent carriage drawn by six miserable nags in filthy harnesses."

Not everyone was so sensitive to the irony of these contrasts, and undoubtedly many didn't see the point of being westernized. "This tension between Russians and outsiders has been going on for centuries," said Bill Thomas, a Russia expert I spoke to in Washington, D.C. "They've been inviting foreigners in for centuries. But in the face of Western culture they're incredibly insecure."

This tension still quivers between Russian culture and the West; I felt it often. One morning I was on a Moscow trolley, lurching toward the Kremlin with Svetlana, my interpreter. She was explaining something about politics to me; it may be that she mentioned Stalin. Suddenly a threadbare woman with tarnished red hair pushed up to her. "Do you know Russian?" she snapped.

"Of course," Svetlana replied.

"Well, stop throwing mud on this country!" She began to rant, glaring at me, the Westerner, and Svetlana, the traitor, with pure hatred.

But to many Russians, Western culture exerts an irresistible lure. That same evening we went to a political rally and rock concert behind Red Square. It was Russian Independence Day, and Boris Yeltsin had just given a speech. Then a series of rock bands began to play, and 100,000 people began to dance. The early evening sunlight was deep and rich. There were girls with green fingernails and black vinyl shorts, a few choice examples of modern Western culture exuberantly and unabashedly adopted.

Above the crowd was an American Confederate flag being swirled back and forth by a tall, muscular boy. Astonished, I made my way slowly through the crush to ask him why. "It's an old American flag," he explained happily.

"Yes, I know," I said, intuiting dark references to war and revolution. "But why are you waving it?"

"It's for Elvis," he replied.

CATHERINE WAS MARRIED on August 21, 1745, in a sumptuous ceremony in the Cathedral of Our Lady of Kazan in St. Petersburg. She was 16 years old. Later portraits make her look imposing, but her wedding dress of silvery silk, now in the Kremlin Armory, implies a slight figure barely five feet tall. That night her new husband stayed up drinking with his servants, appearing in her bedroom early the next morning only to fall asleep.

The following years were hell. Peter took

"Fate is not as blind as one imagines," Catherine wrote, trying to explain how she came to assume the throne of Peter III (below right), grandson of Peter the Great. Historians cite her political instincts and his contempt for Russia. But by overthrowing her husband, who was murdered soon after by her supporters, Catherine put herself in jeopardy. Her claim to succession was their young son, Paul, then as oblivious as this baby in Tauride Garden.





GEORG CHRISTOPH GROOTH (LEFT) AND PIETRO ANTONIO ROTARI, BOTH STATE HERMITAGE MUSEUM, ST. PETERSBURG



Stripped of their gold by the new empress, figures of Atlas adorn the baroque palace of Tsarskoye Selo. Catherine favored the austere neoclassical style that spread across Europe during the Age of Enlightenment;



it became an emblem of her Western taste. Turning philosophical ideals to political ends, she presented herself as the Roman goddess of wisdom—Minerva Triumphant—an autocrat ruling for "the good of each and all."

a mistress and tormented Catherine with constant insults. Because the volatile Empress Elizabeth, Peter's aunt, limited Catherine's time at court, Catherine spent many hours reading—Tacitus, Montesquieu, and Voltaire, among others. She would also go riding, sometimes for 13 hours a day, on a special saddle that she had converted from the usual decorous sidesaddle to one that allowed her to ride astride. "The more violent this exercise was," she admitted, "the more I loved it."

Intelligent, young, increasingly lonely, and increasingly beautiful, she must have been almost unbearably bored and frustrated. And it must have begun to show. "[Catherine] is romantic, ardent and passionate," wrote the Chevalier d'Eon, a secret agent. "She has a bright glassy hypnotic look like that of a wild animal. . . . She is thoughtful and friendly and yet, when she approaches me I automatically back away. She frightens me."

Catherine wrote about her loneliness and sense of isolation. "Had it been my fate to have a husband whom I could love, I would never have changed towards him," she said. Instead, after seven years of passionless marriage (and facing the urgent need to supply an heir), she succumbed to her infatuation with a handsome court chamberlain, Sergei Saltykov. After two secret miscarriages she bore a son, Paul. It is highly unlikely that her husband was the father, but the child would be acknowledged as Peter's.

Catherine spent much of that time at Peterhof, Peter the Great's favorite palace, 20 miles outside St. Petersburg. The main building is an overwhelming assortment of vast rooms encrusted with gold leaf and cluttered with huge paintings. Outside, heavy golden cupolas crown the corners. Strangely large, they make the palace seem hunched and squat. From the terrace the view cascades with the fall of fountains toward the gray, agitated Gulf of Finland.

But Catherine made her home among the trees below, in the palace called Mon Plaisir. The scale here is more intimate, with the homely Dutch elements Peter the Great found so appealing: black-and-white checked floors, rich wood paneling, enclosed fireplaces covered in blue-and-white tile. The shadowy glades outside, with their frivolous fountains, overcame the crushing formality of Peterhof.

In December 1761, when Catherine was 32, her husband finally became tsar. It was no secret that he intended to make his mistress empress. But Catherine had diligently cultivated the sympathy of the very groups—church, nobles, army—that Peter had completely alienated. She was ready to strike.

On June 28, Peter was at Oranienbaum, his estate five miles west of Peterhof. Here, too, there is an immense main palace, but Peter also preferred a smaller place: a secluded two-story building where he was prone to have parties that became all-night binges. Today, unlike the theme-park atmosphere of Peterhof, with tour buses in the parking lot and strolling musicians at choice locations, Oranienbaum seems half derelict. The grounds are empty and gone to seed, and the only strollers are the odd family.

Aleksey Orlov, brother of Grigory Orlov, then Catherine's lover, was part of a small group that had been plotting Peter's overthrow. The carefully planned coup was swift, and within hours Catherine had had herself declared empress and secured the city. By the next day Peter had signed the act of abdication. Seven days later, he was dead.

He died at dinner, under circumstances never satisfactorily explained—Aleksey Orlov, one of the officers guarding him, sent Catherine a hysterical note ("how could we have dared to lay hands on the Emperor? And yet, Majesty, the tragedy happened. He had begun to argue with Prince Fyodor during the meal, and before we could separate them he was no longer!"). Horrified monarchs across Europe, branding her a regicide, predicted a short reign and a terrible end.

CATHERINE began her reign full of great ideas. Her years of reading had filled her with high aspirations. She also had a deep sense of responsibility, an attitude profoundly important to Russians.

"One of the main features of our outlook was faith in the kind tsar," said Sergei Letin, an art historian at the Hermitage Museum. "A Russian tsar wasn't just the head of a big government but the head of a big family."

From the cold grandeur of the Winter Palace, Catherine oversaw the expansion of her empire through wars with the Ottoman Empire and seizures of Polish land. To 19th-century revolutionary Alexander Herzen the palace perfectly symbolized the Russian state: "Like a ship floating on the surface, it had no real connection with the inhabitants of the ocean, beyond that of eating them."



We were walking through rooms full of portraits of Catherine. She gazed out from oil paintings, marble busts, woven tapestries, steel cameos, porcelain figurines. She always had the same expression: noble, kindly, maternal. Visitors to her court were often impressed by her charm—a characteristic not often associated with empresses. She seemed to have some magical combination of regality and what one observer called "a great desire to please."

Russian rulers were usually called Little Father or Little Mother. Catherine assumed this role instinctively. Despite her wide reading of Enlightenment philosophers, with their theories about the natural rights of man, she firmly believed that what Russia needed was a strong hand. She was a tireless worker; her motto was "Useful." She got up early, drank strong black coffee, rubbed her face with an ice cube, and wrote for several hours. Then she would meet with her ministers. Dinner, her main meal of the day, was at 2 p.m. and was usually plain; she had frequent headaches and digestive disorders and wasn't interested in food. Her favorite dish was boiled beef, and she drank wine only if her Scottish doctor prescribed it. After an evening of theater, music, or cardplaying, she went to bed early.

She maintained a spectacular court. "Many of the nobility were almost covered with diamonds . . . and a diamond-star upon the coat was scarcely a distinction," wrote William Coxe, an English visitor. Yet the splendor was primarily to impress visitors. Catherine preferred the unadorned lifestyle of her childhood. She maintained several private rooms in the Winter Palace where she could relax with her friends. Among ten rules posted at the door: "Pretensions founded on the prerogatives of birth, pride, or other sentiments of a like nature, must also be left at the door," and "Speak with moderation, and not too often, in order to avoid being troublesome to others."

Catherine accomplished some early successes. In 1768, in an effort to quell epidemics of smallpox and to flaunt herself as an advanced thinker, she invited an English physician to inoculate her and her 14-year-old heir against the disease. Her subjects were keen to follow her example. She established a legislative commission to revise the legal code. The commission comprised all social classes except the serfs, which was unprecedented for her day. However, it immediately degenerated into petty squabbling, and after a year she disbanded the group. Its one notable achievement was to vote to exalt Catherine as "the Great."

Yet one early decision bore abundant fruit. A year after she became empress, Catherine invited German settlers to homestead Ukraine and the Volga region; Russia needed more people and more agricultural production. She also believed Russia could benefit from German orderliness and industry. Some 20,000 arrived in the first wave of immigration, and



Tending to her country's health, like the staff in this military hospital in St. Petersburg, Catherine presented her early inoculation for smallpox as a lesson to the nation, cleaned up Moscow's water supply, and created institutions to care for foundlings and treat venereal disease.

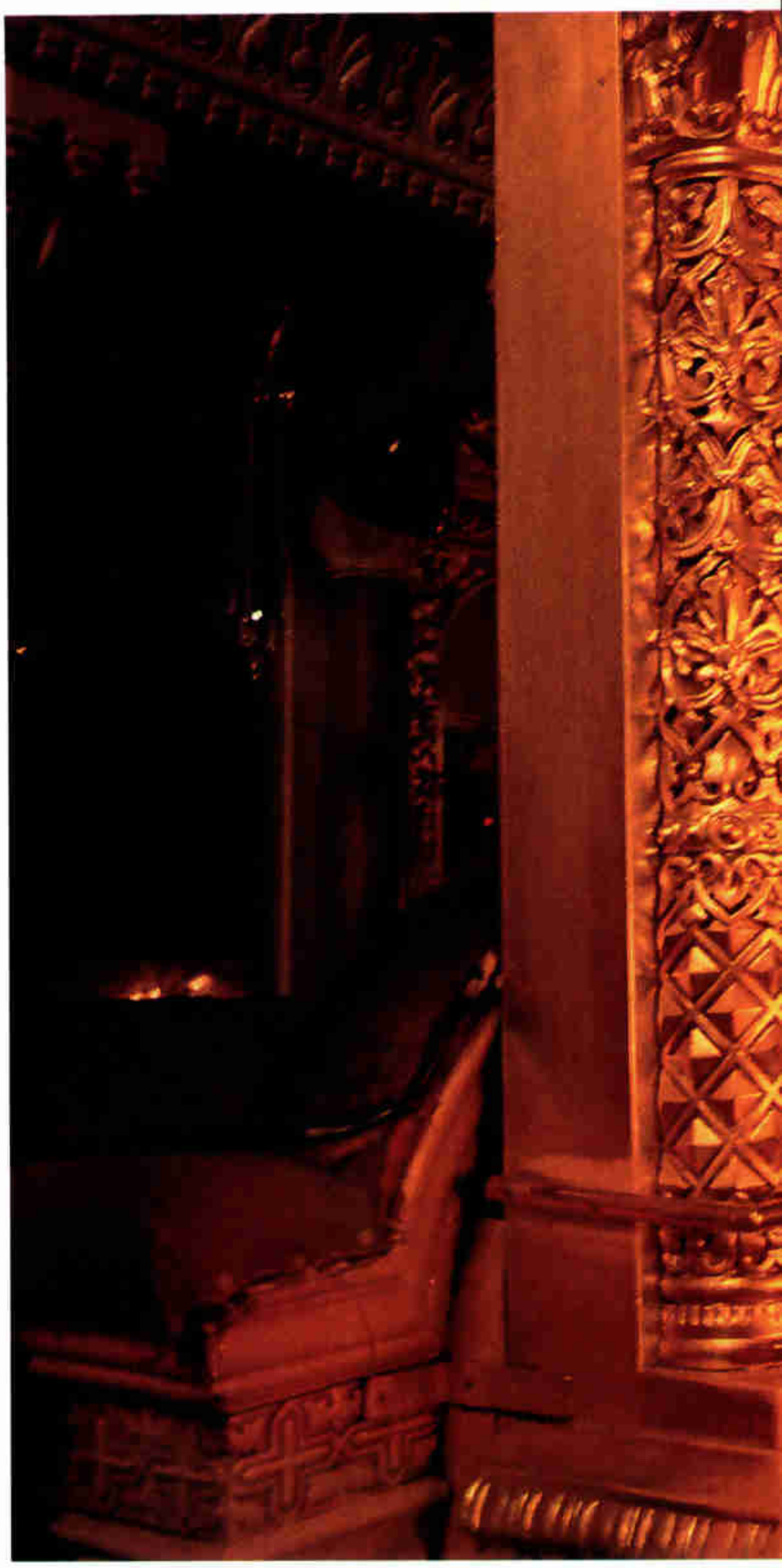
by the turn of the 20th century almost half a million German-speaking Russians were living along the Volga in what would become the German Autonomous Republic.

During World War II Stalin annulled the republic and exiled its residents to other parts of the U.S.S.R. But today, because of programs sponsored by Russia and Germany, many Germans are returning to form settlements again. Russia has also invited settlers from elsewhere to homestead along the Volga.

Some 15 miles south of the city of Saratov, the village of Bagayevka rises above the broad pewter sweep of the Volga. Newcomers have

Candidates compete for admission to St. Petersburg's Repin Institute, the arts academy Catherine expanded in an effort to promote Western learning. Hoping to mold "the perfect citizen" through instruction rather than

intimidation, she founded a national system of free public schools and sent promising pupils to study abroad. Writes historian Isabel de Madariaga, "Where Peter [the Great] used terror, Catherine used persuasion."



Leaning to kiss the image of Mary, a woman in a Moscow cathedral practices the piety Catherine feigned to win the church's blessing. Patron of writers, not religion, Catherine helped foster Russian literature, a tradition that lives in these poets at a reading in St. Petersburg.

been settling here for the past seven years; temporary trailers house the latest arrivals. The first house on the corner sat surrounded by a glorious vegetable garden. A small blond boy was gathering soft fronds of dill.

His mother came out and introduced herself as Lyubov Sogurenko. "Twenty families living here are pure German," she said. "The others were invited from somewhere else." Lyubov is from Tashkent, Uzbekistan, part Tatar and part Don Cossack, with red hair, a strong body, and a radiant smile illuminated by gold teeth below and silver teeth above. They flashed often.

She proudly showed me around her farm. In soil hauled from the river, she had planted onions, carrots, sunflowers, cabbage, corn, peas, beans, blackberries, strawberries, gooseberries, a small grapevine—even five apple saplings. There were ducks, geese, chickens, and two pigs. She held out her rough palms happily: "I'm weeding all day."

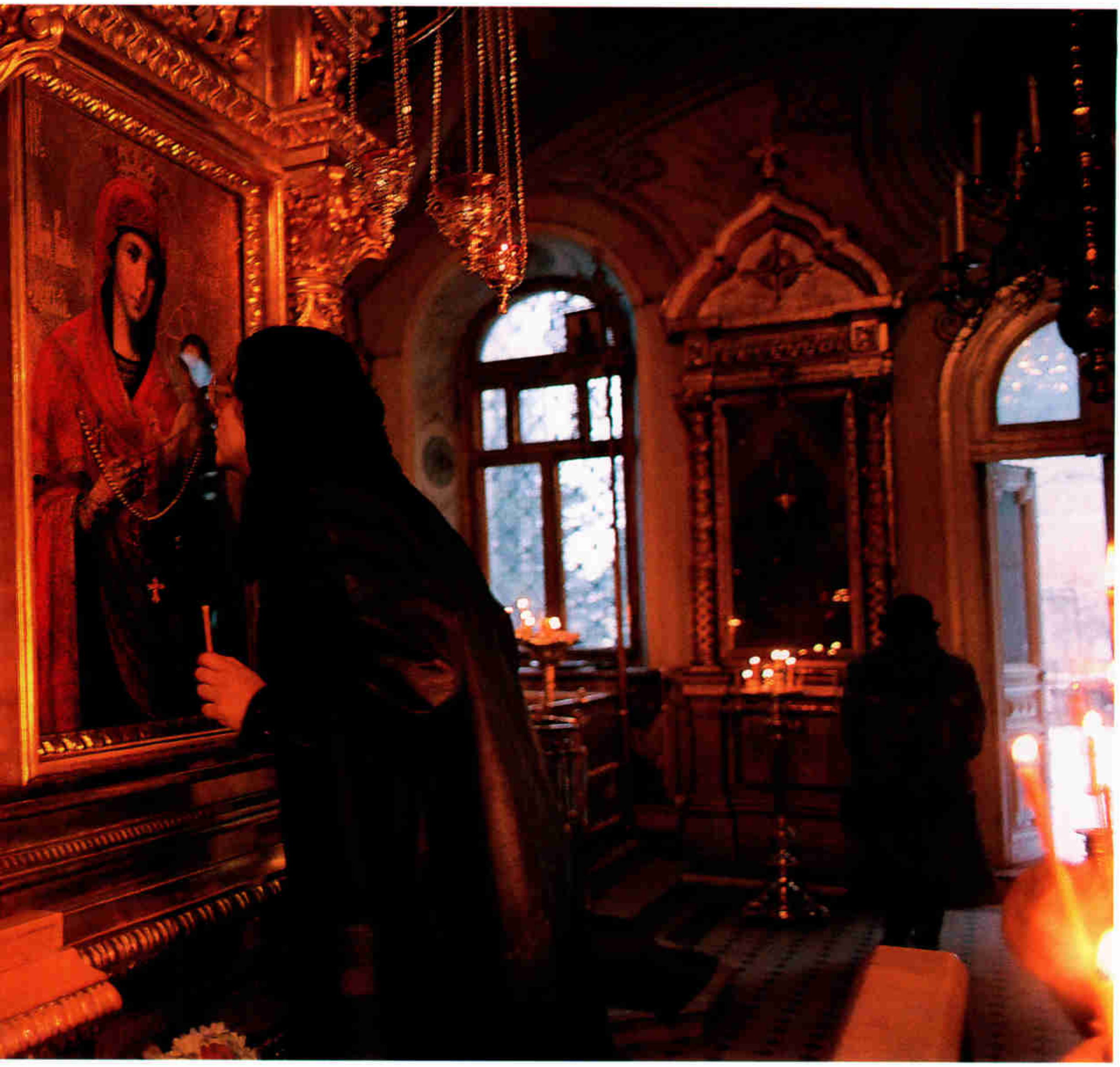
Then she asked me in for tea. The house was cool and plain, with a large television in the living room and also in the kitchen. "My husband is a construction worker," Lyubov said. "But if we had stayed in Tashkent, he'd be unemployed. I worked as a foreman at a shoe factory, but I couldn't support the family by myself. That's why we had to leave. All our money went to the market. But we wanted to feed our children ourselves."

Lyubov poured cup after cup of tea, and we dabbed cream on top of plain cookies. Two clocks ticked, not together. I asked about the upcoming elections. Did she think a woman could make a good ruler of Russia?

"I think it would be better for the country," she replied. "I feel a woman is more serious. You understand, a woman thinks as a mother; a woman knows the problems of the family, all the pains, more than a man. It seems to me that if a woman were president, she would live more for the people, the same way she does for her family. There would be the same order as my kitchen garden; everybody would know his place."

This, of course, was also Catherine's concept of the ideal social order. She had dreamed of a nation inhabited by strong, industrious, optimistic people—people like Lyubov. It would seem to be some utopian fantasy if I hadn't seen Lyubov's red, callused palms.

Catherine knew that progress would require more than settlers; it would require the support of the nobility. As a woman and a foreigner, she couldn't retain power without them. She gradually extended the powers of the aristocrats while annulling the rights of









In the shadow of plenty, children beg by a café. Beyond her court's splendor, half of Catherine's subjects lived as serfs and most others as peasants. In the 1770s heavy taxes and mass conscription sparked a rebellion, which was put down with the help of loyal Cossacks like this man's ancestors.

the serfs. By 1796, the year she died, Russia contained more than nine million male serfs (females weren't counted), more than half the male population. They lived at the mercy of their masters, on whom there were no legal or social constraints. "What is the use of the nobility being free," an elderly noblewoman exclaims in a play of the period, "if we are not free to beat our serfs?" The fields were ripe for revolution.

In 1773 an obscure Cossack named Yemelyan Pugachov rose up. For an entire year his followers swept across Russia capturing cities, pillaging estates, and murdering nobles. They were preparing to march on Moscow when Catherine's army finally stopped them; Pugachov was executed. But Catherine was never the same. More concerned by the impression this turmoil would make abroad than in addressing the injustices that had caused it, she explained it to Voltaire by saying that Pugachov came from a part of Russia that was "inhabited by all the good-for-nothings of whom Russia has thought fit to rid herself over the past 40 years, rather in the same spirit in which the American Colonies have been populated." She abandoned any further attempts at serious reform.

"MY MISFORTUNE," Catherine wrote frankly, "is that my heart cannot be happy, even for an hour, without love."

This is the clearest explanation of the whole tortured subject of what were officially termed her "favorites." Her love letters show an unembarrassed eagerness to abandon herself completely and to believe her lovers to be absolute ideals. Far from being quick, anonymous encounters, these affairs—estimates vary from 12 to 20—were fairly long, ranging from one to twelve years.

Many European rulers were quick to defame her, primarily for political reasons,







Reconstructing Russia, Catherine encouraged the cultivation of new crops such as potatoes, now common in city markets. In her capital, still cluttered with engineering projects (below left), she inspired a saying: "When she came [it] was of wood, when she left it was of stone."

and sexual slander was the easiest weapon at hand. One of the kindest insults was "Messalina of the North," after Roman Emperor Claudius's insatiable wife. Ugly myths took root: that her lovers were chosen for her and that her lady-in-waiting "auditioned" them.

Wanting a companion as much as a romance, Catherine made an effort to educate at least a few of her lovers in political matters. Some were relative nonentities; others—such as Grigory Orlov (the dashing guards officer who helped put her on the throne), Stanislaw Poniatowski (she later made him king of Poland and broke his heart), and Alexander Lanskoi—were strong individuals who deserved her devotion. Her grief at Lanskoi's sudden death from diphtheria was genuine: "My happiness is gone," she wrote to a friend. "I have thought of dying myself. . . . My room which until now was so pleasant has become an empty cavern into which I drag myself like a ghost . . . I cannot see anybody without being choked by sobs. I cannot sleep, nor eat. Reading bores me and writing exhausts me."

The one lover who left a lasting mark on her as well as on Russia was the charismatic Grigory Potemkin. He is well known as the creator of the so-called Potemkin villages—which his enemies claimed were constructed only of false fronts, to give the impression of a village where there wasn't one in order to impress Catherine on her tour of the Crimea in 1787. But he was also an effective reformer of the army and an astute statesman who negotiated the annexation of the Crimea, which he spent years developing—founding cities and universities, building roads, opening shipyards, and attracting settlers. Although they were lovers for only two years, he remained one of her closest confidants and labored tirelessly on her behalf.

The last year of Catherine's life was 1796. She had once sworn to live to 80, but now, at 67, she could sense that she wouldn't make it. Heavy and bloated, she felt the even heavier weight of accumulated disappointments. Her daughter, Anna, had died as a baby; another son, Aleksey, lived away from court. Her heir, Paul, openly loathed her, and his personality was alarmingly like his supposed father's—unstable, extreme, and obsessed with the military. She intended to make her grandson Alexander her legal heir instead.

In September came a crushing blow: Young King Gustavus of Sweden publicly broke his engagement to her granddaughter Alexandra. The rebuff was insupportable; Catherine may have suffered a slight stroke. One evening she saw a shooting star and told her companion,



Mocking himself, a sculptor displays his physique in an old bathhouse closed by the government but visited weekly by a small group of artisans. Adding to the gossip of the day, Catherine rendezvoused in such a steamy

setting with the statesman Grigory Potemkin, fifth of her many lovers. Though politically powerful, Catherine was emotionally vulnerable. "She sometimes felt achingly lonesome," writes historian John T. Alexander.

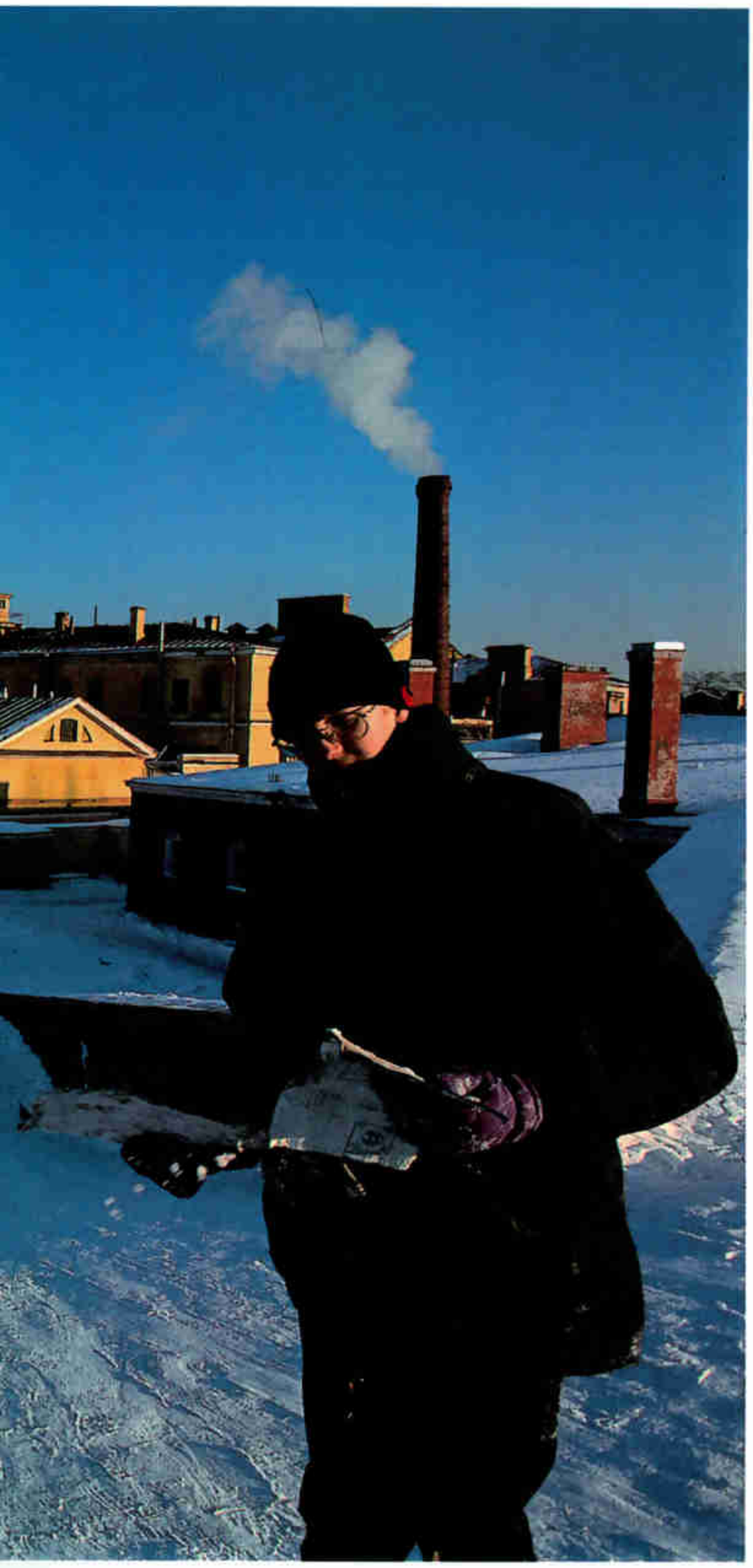


After a quarter century of rule Catherine, in her late 50s (above right), presided over a vaster, stronger, and more prosperous Russia. Laid to rest at age 67 in St. Peter and St. Paul Cathedral within an island fortress in St. Petersburg (above), the empress was largely ignored by the Soviets but is celebrated today by a new generation embracing Western ideas.

"That is an omen of my death."

On the morning of November 5 she followed her usual routine in her private apartments within the Winter Palace in St. Petersburg. Outside, snow had already covered the impressive palaces lining Nevsky Prospekt, the city's main boulevard. Then she went into her bathroom. Servants found her slumped on the floor, the victim of a massive stroke.

She lingered until 9:45 the next evening. Paul knew that Catherine intended to name her grandson her heir; immediately after her death Paul sealed her study, and an act of succession was never found. Later he had



Peter's body exhumed and laid in state next to Catherine's in the Hall of Pillars. Above their heads he placed the grotesque inscription "Divided in Life, United in Death." The funeral cortege crossed the frozen Neva to the Cathedral of St. Peter and St. Paul, where they were buried side by side.

I stood in the cathedral on a chilly June morning. Pale light was pouring through the tall windows, and the trees thrashed in the wind. A golden iconostasis stood in front of the apse. There were empty holes where paintings were supposed to be. It looked like an unused stage set. There were no candles, no



MIKHAIL SHIBANOV, STATE HERMITAGE MUSEUM

lingering perfume of incense, nothing to suggest the elaborate Orthodox liturgy. Catherine's tomb was like many of the others: a plain white marble oblong with her name and her dates in brass lettering.

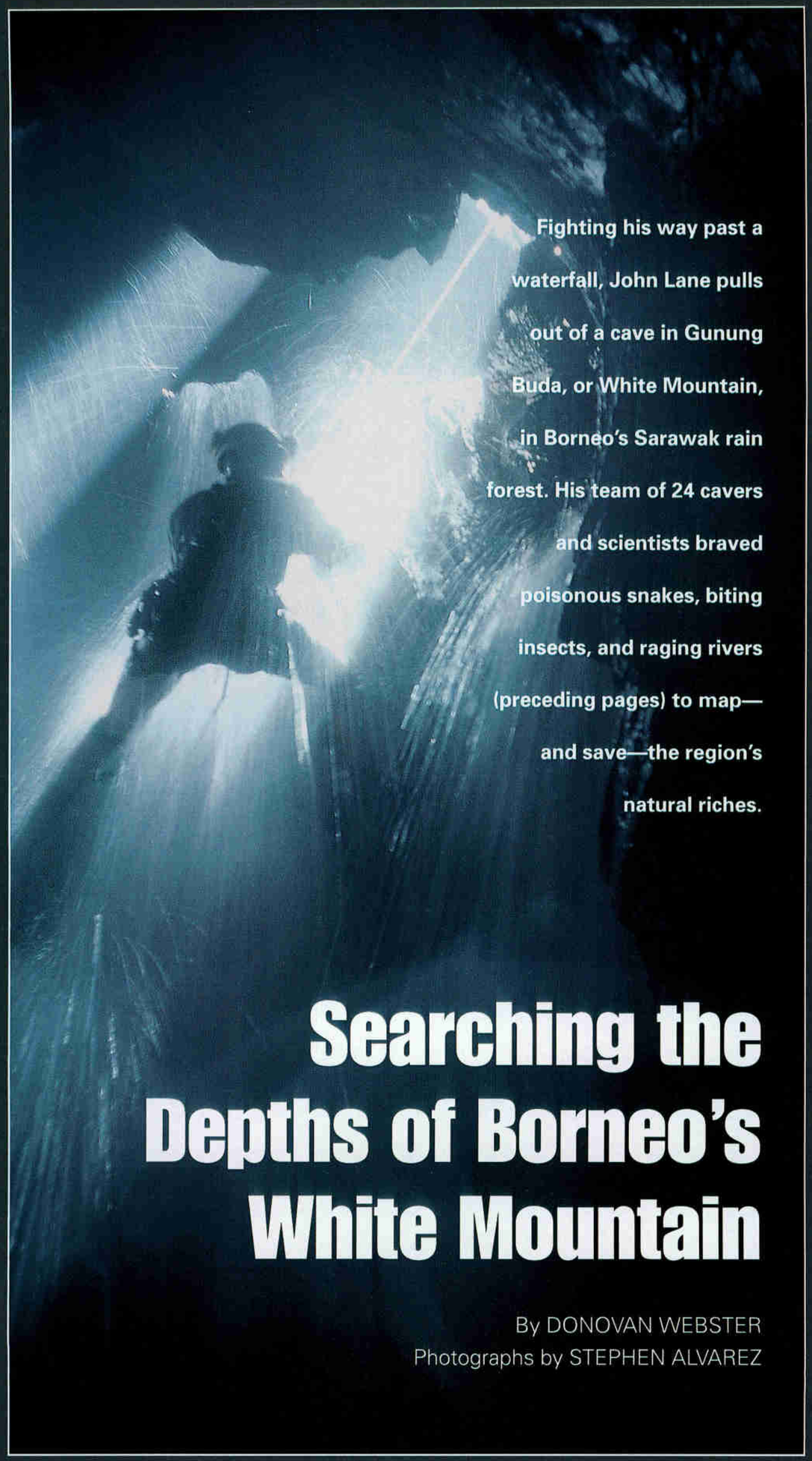
But what memorial would I have wanted to see? A statue of her, as she loved to be portrayed, as the benevolent lawgiver? Her laws benefited few and required financing that burdened the country with a 200-million-ruble debt. Enlightened monarch? "The ideas of the century," one critic commented, "passed over her like a beam of light on the surface of a pool, without warming the depths below."

And yet, amid the failures, there remains the woman herself. A woman who could entrance visitors and win the adoration of her servants; a woman who loved to laugh and who wouldn't let certain plays be performed without first tacking on a happy ending.

I couldn't think large thoughts in front of such a small tomb. Here and there were a few offerings, some lilacs or carnations in plastic vases. A few days earlier, at one of her estates, I had picked a cream-colored wild rose. I couldn't resist its scent: powerful yet delicate, complicated, voluptuous. I realized now I should have brought it here. □







Fighting his way past a waterfall, John Lane pulls out of a cave in Gunung Buda, or White Mountain, in Borneo's Sarawak rain forest. His team of 24 cavers and scientists braved poisonous snakes, biting insects, and raging rivers (preceding pages) to map—and save—the region's natural riches.

Searching the Depths of Borneo's White Mountain

By DONOVAN WEBSTER
Photographs by STEPHEN ALVAREZ

"If you fell on one, you'd impale yourself," says caver Trent Atwood, foreground, of razor-edged limestone pinnacles in Tardis Cave. Such spires take millions of years to form as water dissolves the limestone.

IT RISES LIKE A DAGGER above one of the oldest rain forests on Earth, a peak of pale limestone cloaked by vine-throttled trees. Called Gunung Buda—White Mountain—the 3,161-foot formation deep in the jungles of Borneo holds a secret within. Rainwater has been trickling through the rock for eons, dissolving the peak's interior into sprawling systems of voluptuous grottoes and uncharted pits. And somewhere in one of these caverns, breathing air reeking of bat guano, coated in slick mud, I sit alone and lost.

Behind me water drips from the ceiling into an urn-shaped pool. Ahead my helmet's lamp cuts the blackness. When I switch the light off to conserve battery power, there is only the clammy dark, the chuckle of slow-moving water, and the occasional *cheer-reep* of a bat on a flyby. If I flip the light back on, clusters of bright green gems—the multiple eyes of hand-size, poisonous huntsman spiders—duck behind rock overhangs and the jagged rubble floor.

I'm sitting here because after hours of following expedition co-leader Todd Burks, photographer Stephen Alvarez, and Stephen's assistant Trent Atwood as they scrambled and crawled through the vertical rifts and giant oval caves of this mountain, I became so exhausted that further exploration was dangerous. So after a break to recharge my strength, Atwood consented to return above ground with me.

But now, deep inside this honeycomb of a mountain, we're disoriented. Each passage looks like the others. When we come to a ganglia of connecting passages, any option we choose makes a quarter-mile loop back here. So as Atwood continues his predictable laps ("I know we're missing one turn somewhere," he says at each circuit), I wait by this water hole, the only place that Burks and Alvarez must pass on their way toward sunshine.

I should have expected this. After all, on maps of Sarawak—as this Malaysian state on the island of Borneo is known—legends bear these cautions: RELIEF DATA INCOMPLETE . . . GENERALLY FOREST COVERED . . . MAY BE SIGNIFICANT POSITIONAL DISCREPANCIES IN DETAIL. So here I am, a 37-year-old father of two—a man with a future to consider—scared and stranded beneath the ground at the edge of an uncharted jungle, where maps actually *apologize* for being unreliable.

Yet even as Atwood and I bumbled in circles, with each new step a once hidden world opened in any direction we looked, which is one of the lures of this offbeat adventure. I flip my lamp back on, aiming its beam at the ceiling. Gooey-looking white drips of deposited limestone hang suspended in open air. Beyond them a dark and inaccessible shaft rises up through the cave's roof like a ramp extending toward eternity.

When Atwood reappears, we sit together in the darkness. Suddenly in the passage behind us I hear Burks and Alvarez returning. Their headlamps



slash the gloom with friendly bouncing beams.

"You lost?" Todd Burks asks when he sees us.

"Yeah," I say.

"Well, I know the way out," Burks says, his smile caked with mud. "Let's go."

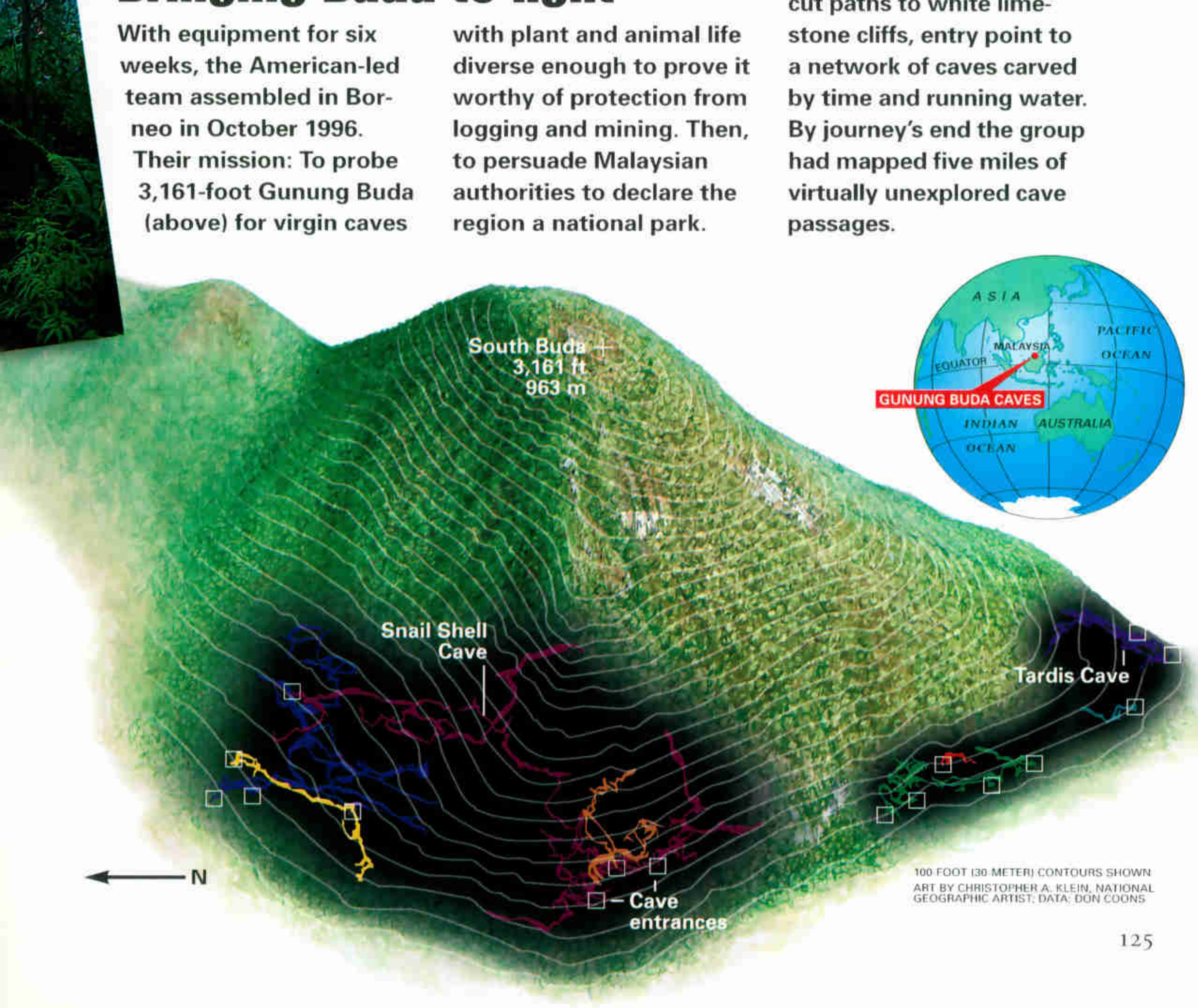
We've come to Borneo on a mission: To help save Gunung Buda from the chain saw and jackhammer. Encircled by logging and mining concerns, the mountain's heights are outside the reach of these industries, which have stripped much of Malaysia's old-growth forests. Malaysian government officials have recognized Buda's situation and want to place the mountain and its surrounding rain forest

DONOVAN WEBSTER has slogged through the Gobi and Venezuela's Orinoco River wilderness for the GEOGRAPHIC but says this was his most demanding assignment. A native of Sewanee, Tennessee, STEPHEN ALVAREZ has explored caves since he was a boy.

Bringing Buda to light

With equipment for six weeks, the American-led team assembled in Borneo in October 1996. Their mission: To probe 3,161-foot Gunung Buda (above) for virgin caves with plant and animal life diverse enough to prove it worthy of protection from logging and mining. Then, to persuade Malaysian authorities to declare the region a national park.

Old logging roads (left) cut paths to white limestone cliffs, entry point to a network of caves carved by time and running water. By journey's end the group had mapped five miles of virtually unexplored cave passages.



100 FOOT (30 METER) CONTOURS SHOWN

ART BY CHRISTOPHER A. KLEIN, NATIONAL GEOGRAPHIC ARTIST; DATA: DON COONS

in a protected management zone—but they need an inventory of the area's treasures to support their plan.

"Whether the government sets the area aside this year, in five years, or never depends on what's discovered out there," says Dave Gill, a Sarawak forestry department representative.

TO ADD MORE INFORMATION to the crucial data accumulated by a previous expedition, our team of 24 cavers, explorers, cartographers, biologists, and photographers will spend November and early December mapping cave systems while piecing together a broad, multidisciplinary survey of life on and beneath the mountain's surface. Our herpetologist will collect amphibians, fish, lizards, and snakes, some poisonous. One helpful expedition member will carry an extremely dangerous snake called a banded krait to camp in his fanny pack, prompting our snake expert to write on the galley announcement board: "PLEASE, NO POISONOUS SNAKES IN CAMP!"

Our entomologists will collect all freakish manner of insects. Our biologist will catalog everything from cave-dwelling spiders to albino crabs to millipedes. A hydrologic team will introduce nontoxic dyes into the cave's subterranean rivers to see where they exit the mountain, providing a better idea of how water travels through Buda. Our archaeologist will photograph and document sites of human habitation, whether ancient or recent.

All these data, plus maps of each cave we discover, will be entered into our laptop computers, with each of us taking turns at the keyboards late into the night. Everyone knows the clock is ticking.

"We're fighting against time," John Lane, co-leader of the expedition, tells me early in the trip. "This area is covered with trees that would make valuable lumber. And the limestone of the mountain could be used to make a lot of concrete."

Doing good science is our top priority, but in the jungle everything takes a backseat to survival. After only a week in Borneo our camp resembles nothing so much as a pirate village. As the first glow of dawn lights the sky, the team rouses in an open-sided, tarp-roof structure, whose raised floor keeps us out of the mud and discourages snakes from becoming bedfellows. Tired groans mix with the high-pitched whistles and shrieks of the jungle as dirty, unshaven cavers push aside mosquito netting and pull on slowly rotting boots and pants that, last night, were hung on rafters to partly dry in the steamy air. Outside, the mist swirls through the rain forest, where layers of overstory and shrubby underthicket make it impossible to see farther than 50 feet. Sweat bees are swarming over our skin and clothes. And in the jungle, fat, black leeches wait to attach themselves to our ankles and armpits.

In the constant humidity of the rain forest the threat of fungus and infection means that all cuts, scratches, and bites must be cleaned two or three times a day or softball-size inflammations will blossom overnight. Nobody



One false step and camp manager Paris Wan (right) could be left dangling over a ten-story drop into a vertical passage called Croc Pot. The name was inspired by local guides, who believed that nearby tracks meant crocodiles lurked in the pool below.

Squeezing through a muddy hole, caver Brad Stewart (above) sizes up one end of Snail Shell Cave. At 1,546 feet from top to bottom, this cave system has one of the greatest vertical changes of any in Borneo.



knows this better than Brad Stewart, who was slow to tend a gash on his shin and awakened to find his ankle and foot bloated to the size of a grapefruit.

By six o'clock in the morning the kitchen has hot water and coffee, and the cavers are already carrying their plastic carbide-lamp helmets—like those that coal miners wear—as they crowd around the rough dining tables for a briefing by John Lane. Lane looks more like a banker than the leader of a caving expedition. He grew up in the suburbs of San Francisco, exploring caves across the West as soon as he left home.

By the 1980s, still in his 20s, he had explored cave systems in the United States, Belize, and Guatemala. Then in the early 1990s he read about *several recent British* expeditions to Sarawak. The Brits had discovered some of the world's most spectacular caverns, including the monstrous Sarawak Chamber, which at 40.2 acres with a 260-foot-high ceiling is nearly as large as the Louisiana Superdome.

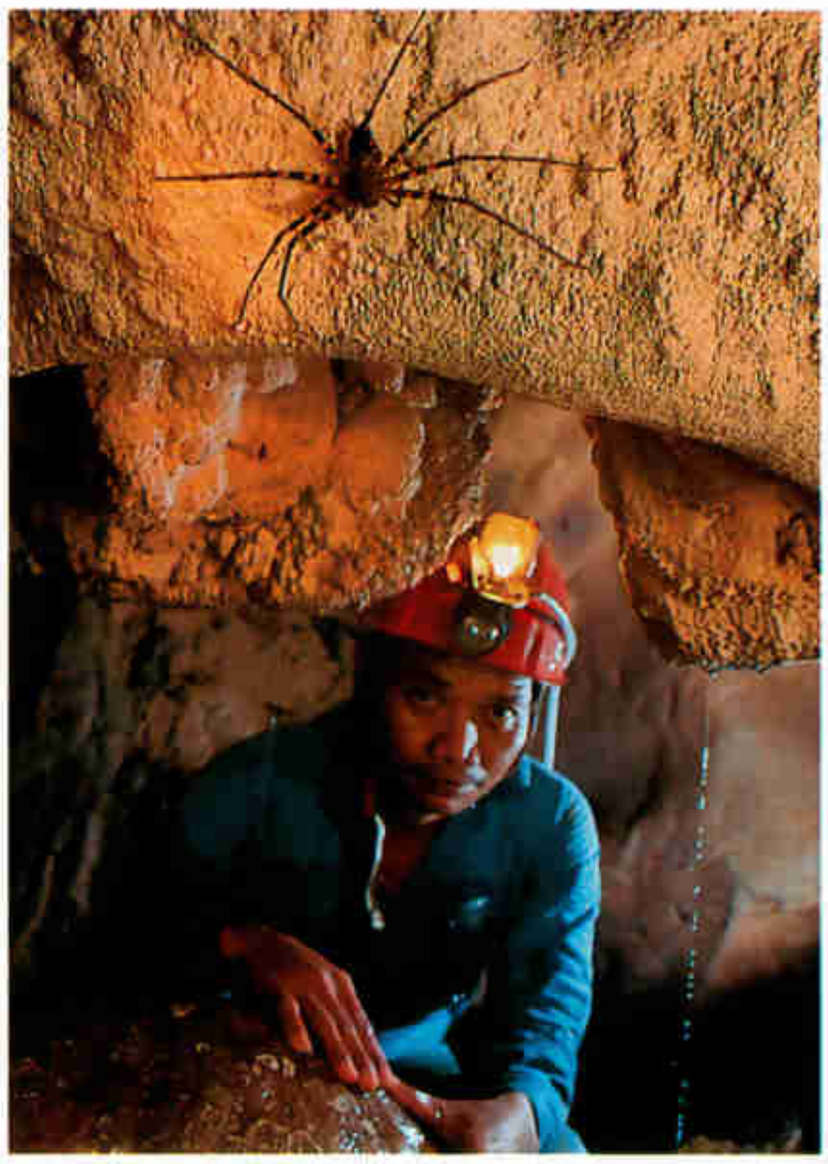
"I knew I had to go," Lane says.

In 1995 Lane and caver George Prest led their own expedition to Gunung Buda. With only eight weeks in the field, their 18-member team discovered 14 new caves and mapped 18 miles of passages.

As he finishes his coffee, Lane gives out assignments. Some cavers will explore, others map, and still others fetch and purify water. Cavers are some of the most enthusiastic (and least heralded) athletes on Earth, but even they occasionally need to be bullied.

"We're on an expedition," Lane tells them, knocking his fist against a table for emphasis. "Which means you sacrifice your body. You don't sleep or eat much. You push yourself to your limits for one month—then you go home and rest. This kind of sacrifice may not always be fun. But if you do it right, a month of





Following the flow, Brad Stewart explores an underground river in Snail Shell Cave (left). This terrain can quickly turn dangerous. Heavy rain can raise water levels five feet in one hour, making impassable the section where cartographer Chris Andrews and guide Thambi Epoi take measurements (below).

A large huntsman spider poses a lesser threat to Epoi. Says one caver, "Their bite is bad, but nobody has died from one."



struggle can yield results you'll be proud of for the rest of your life."

To discover Buda's secrets, we have to claw up steep vine-choked slopes over sharply eroded, boot-eating limestone. Most cave entrances are at least a hundred feet up the slope.

One afternoon I'm exploring a cave system called Snail Shell. A spiral of ramps and passages that rise and splay beneath the mountain's southwest side, Snail Shell roils inside the mountain for more than 1,540 vertical feet, with nearly seven miles of passages. I'm crawling through mud on my hands and knees in a wide, low-ceilinged passage that tilts upward at a 45-degree angle.

"Hey, Moe! Look out!" Todd Burks says from somewhere behind me, doing his best Three Stooges imitation. *Crack!* My caving helmet collides with a pencil-size stalactite suspended from the ceiling. Shards of gritty limestone rain down the back of my neck and arms.

The going is slow. In this mud you've got to push forward a few careful inches at a time or risk sliding back, out of control, cutting yourself badly as you shear off dozens of stalagmites. My helmet sits just low enough on my brow that once in a while I don't see a hanging formation and knock it loose anyway.

A bat flits past my right ear. I pause, my headlamp flickering against the low rock ceiling. I'm beginning to regret this whole experience. After 60 or so yards, however, the roof of the cave lifts again, and I can rise off my belly and walk.

The passage tilts relentlessly uphill, and the floor remains slick. I fall, scraping my shin on a limestone blade. Ahead, the passage flattens for ten yards, then opens into darkness. Along one wall, a narrow mud-covered shelf—

Big sky and deep horizons break the cave routine for Todd Burks, who rappels 300 feet down to the forest floor after a dramatic mountainside survey.

Surviving a potentially deadly attack of ground hornets on his way up, Burks hoped to investigate two virgin caves he had spotted on an expedition in 1995. After a two-day, muscle-wrenching climb, he discovered that the caves extended a mere 20 yards into the mountain.



perhaps six inches wide and 15 feet long—hangs above a dark pit. It's the only way across. I have no choice. Grabbing stalagmites that rise above the shelf, I begin along its narrow length, belly against the wall.

"Don't look down," Burks advises.

I take another step sideways. The lugs on my boots are caked with mud. I feel the slickness of mud on mud, my footing unsteady. One step. Another. I reach to grab the next stalagmite and my foot slides free—I'm falling.

"Whoa!" Burks and I say simultaneously.

I slap both hands across the stalagmite—it's the size of a Coke bottle—and slam against the cave's wall. This is like a bad dream. In the darkness, my heart pounding, I'm hanging above a black pit. My feet drift in the air for what seems an eternity. I'm simply there, suspended, my breath booming in and out, wavering with adrenaline.

"Slow, man, slow," Burks coaches. "You'll be OK, just pull yourself back up."

Finally, after deciding the stalagmite won't give way, I pull myself up gently—a quick movement could snap the limestone—set my feet back onto the shelf, and slowly lower my weight onto it.

Shivering with fear, I take a few steps onto a broad floor beyond the pit. My knees are shaking. Behind me Burks, a veteran caver, blithely traverses the shelf. The walking is easier now, the floor eroded into wet and muddy channels, between which rise strips of solid rock. A hundred yards later the passage stops short at a cliff, where a sheer-walled shaft rises up into the darkness with no footholds or handholds. Dead end.

Our headlamps reveal only bits of the cliff, illuminating the rock in small, dim patches, but there is clearly no way to go forward. That's how it often turns out for cave explorers. Having struggled so hard to push deep into the ground, we've been defeated by something as elementary as a 20-foot wall and the pull of gravity. We turn around and go back.

EVEN AS the expedition's hard-core cavers continue to probe new passages, other team members are busy above ground cataloging the region's diverse wildlife. As night falls on the logging road a quarter mile outside camp, Nathan Schiff, an entomologist on field-study hiatus from his job with the U.S. Department of Agriculture, calls in a thick cloud of bugs.

To accomplish this, he and another expedition entomologist, Steve Heydon, use a technique called black lighting. Hanging a large white sheet vertically above the ground, they've positioned a mercury-vapor lamp and an ultraviolet bulb behind it, illuminating the area with a ghostly blue glow.

"It brings them in from all over," says Dr. Schiff. "All different kinds of species are attracted. They can't keep away. When they land on the sheet, we can choose the taxa we want to collect. It's easy."

Beyond us the night is alive with the mating calls of frogs and katydids. Schiff, a stout 38-year-old with boundless enthusiasm, can't contain his admiration for every leaf and beast in the jungle.

"This may be the oldest forest on Earth, 100 to 150 million years," he says, lifting a hand and gazing up to where the treetops meet a rare starry sky. "In all that time, the forest has stayed pretty much the same."

True to Schiff's advertisement, insects have started homing in on the black light sheet from every angle. The largest of them are brown-and-white uraniid moths. Each as big as a pie plate, they dive toward the glowing sheet along vectored corkscrew paths.

A few feet off the ground, giant flying beetles motor toward the sheet like dark fastballs out of the black night. "Those are mostly females, scarabs," Schiff says. "The males are really remarkable as specimens. They have three large horns on their head."

Soon the sheet is plastered with insects, and Schiff and Heydon go to work, plucking specimens and placing them inside their collecting bottles, which are lined with a paper towel saturated in ethyl acetate. The jars humanely dispatch the animals, allowing the scientists to take field notes on them the following afternoon before packing them away for shipment to their offices—Schiff in Albany, California, Heydon at the University of California at Davis.

"I'm sure we'll collect hundreds of new species out here this year alone," Schiff says, his hands moving quickly as he plucks new bugs. "It will take 20 years to identify them all."

He shrugs, then turns and takes in the canopy of trees again. All night long, insects will

fall like raindrops toward his trap, their long trip to the United States just beginning.

SNAKE EXPERT Ralph Cutter has been scooping up reptiles both in the caves and in the forest. The most tantalizing for him are four-foot, gray-and-yellow-striped cave racers that dangle just out of reach on stalactites. From these seemingly impossible perches, they wait to snatch a cave swiftlet or bat as it flies past. So far he has been unable to collect the elusive snakes.

He's had better luck in the jungle. On a blisteringly sunny morning I follow Cutter along an overgrown path about three miles from camp. He pushes a steel hook ahead of him. The hook, at the end of a long golf-club-style shaft, is all that stands between him and a venomous snakebite. If he comes upon a cobra or krait, he can lift the snake and examine it from a safe distance.

"We have to assume every snake is poisonous," he says, "because with many of the species we just don't know."

As Cutter creeps forward, he tells me about one species of cobra in Borneo that spits venom into an enemy's eyes from as far as five feet away. The venom shocks and momentarily blinds prey—leaving it susceptible to fanged attack. "That's why jungle guides wear shiny pendants around their necks in the bush," he says. "If they get a spitter, the cobra thinks the shiny jewelry is an eye—and it spits venom at the pendant instead of into their eyes."

I look at Cutter. He has a pendant dangling across his chest.

"Don't worry," Cutter says. "We're moving slow. We'll be fine."

Suddenly a small tan-colored snake snaps to consciousness in a rainwater pool ahead of us. It begins to zip beneath a downed tree.

"Snake!" Cutter shouts. The animal disappears beneath the log, and Cutter tosses aside his hook, tumbling into the puddle on his knees, going after the reptile with his bare hands and grasping it by the tail. As his hand follows the animal into a muddy concavity under the tree, he uses his fingers to follow its body toward the head. Cutter finds himself in a standoff, ultimately having to release his grip.

Standing up to strip the mud off his legs with an open hand, Cutter launches a hangdog

Cracked pottery and bits of human bones litter the floor of Urn Cave, a weathered 200-year-old burial site probably for the indigenous Tabun. After a body was allowed to decompose in the forest, the bones were placed in an urn and carried up the mountain to the sacred resting-place.



grin. "Man, am I stupid," he says, shaking his shaggy head. "Here I am, talking on and on about treating every snake like it's poisonous. Then I get excited and go after the first one I see with my bare hands!"

BY THE TIME our expedition comes to an end in early December, Lane, Burks, and the others will have collected a mountain of evidence to support protected status for Gunung Buda. They'll discover three new cave systems, mapping five miles of new passages. They'll capture hundreds of species of wasps, beetles, ants, spiders. And later, citing this team's findings as well as those of Lane and Prest's 1995 survey and the results of a Prest-led expedition in 1997, James Wong, Minister of Environment and Housing, will recommend that the government set aside the Gunung Buda region as a national park.

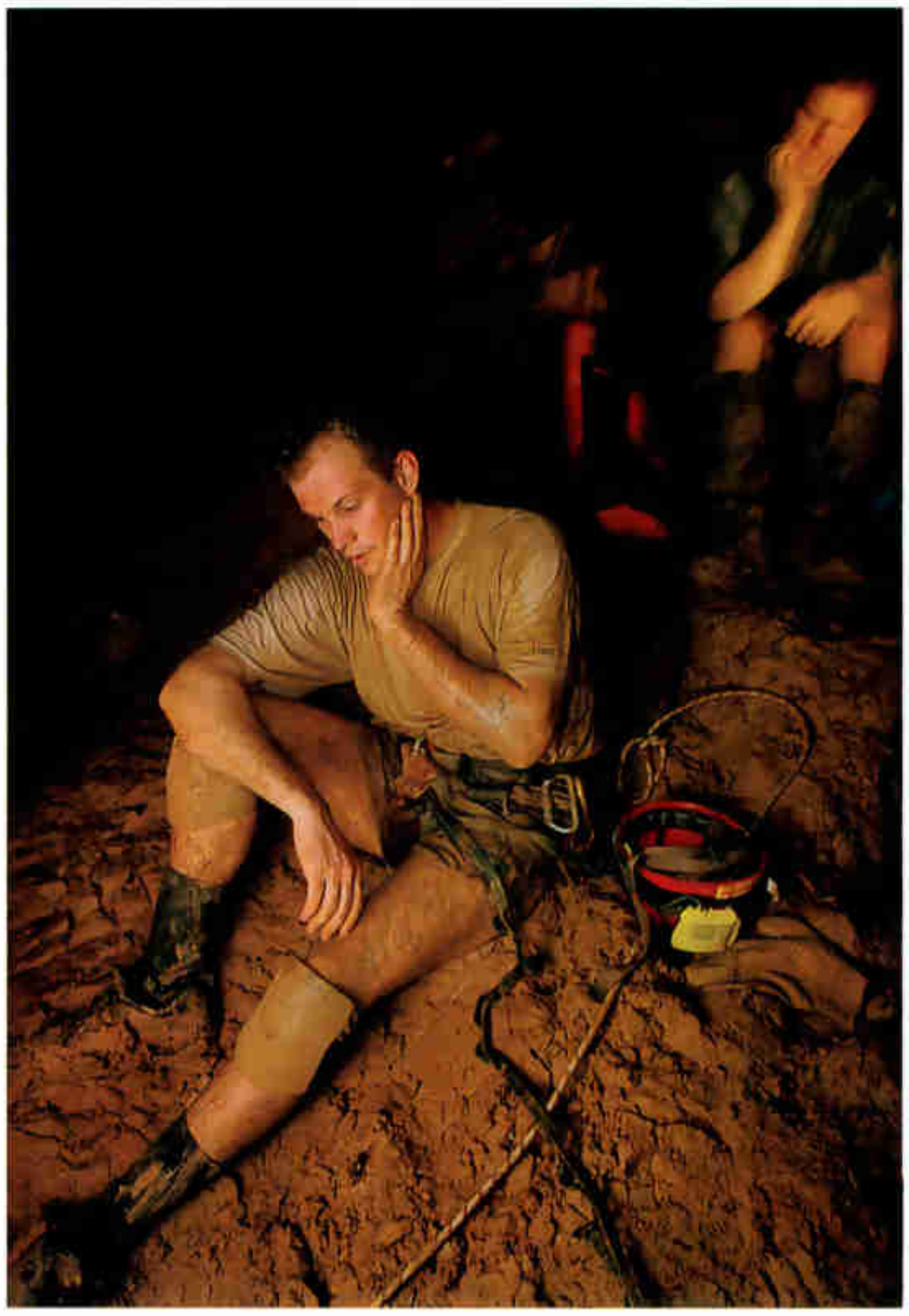
But this morning, a week before our team is due to go home, Todd Burks has only one thing on his mind. Three hundred feet above the jungle a pair of virgin caves stare out into the darkness from Buda's ghostly face. Yesterday Burks climbed more than halfway up the sheer cliff before reaching exhaustion. Today he plans to finish the climb and explore the caves.

As he ascends, he places metal anchors for safety ropes into cracks in the rock. In some places he loops a length of nylon webbing around a limestone pinnacle for protection. In others he uses tiny hooks that grasp smaller blades of limestone, the wall's only features, hoping they will hold him if he takes a long fall.

By early afternoon, after being baked for hours by the sun, Burks watches rainy season clouds start to group and drizzle. By four o'clock a storm is raging. But under the cliff overhang, he gets none of its relieving moisture. An hour later, ten feet below the caves, he hears Chris Andrews shouting. Andrews, a usually reserved Coloradan, is whooping. "You're almost there. It's right above you!" he screams to Burks, whose view is blocked by the overhang. With one more pull, Burks is inside.

As the reds and oranges of the late day sun pour inside the caves, Burks can instantly see that they go nowhere. At one time, millions of years ago, they may have been a subterranean river's oxbow. Now, in the glowing rays of sunset, he figures the caves snake inside the mountain for only about 20 yards.

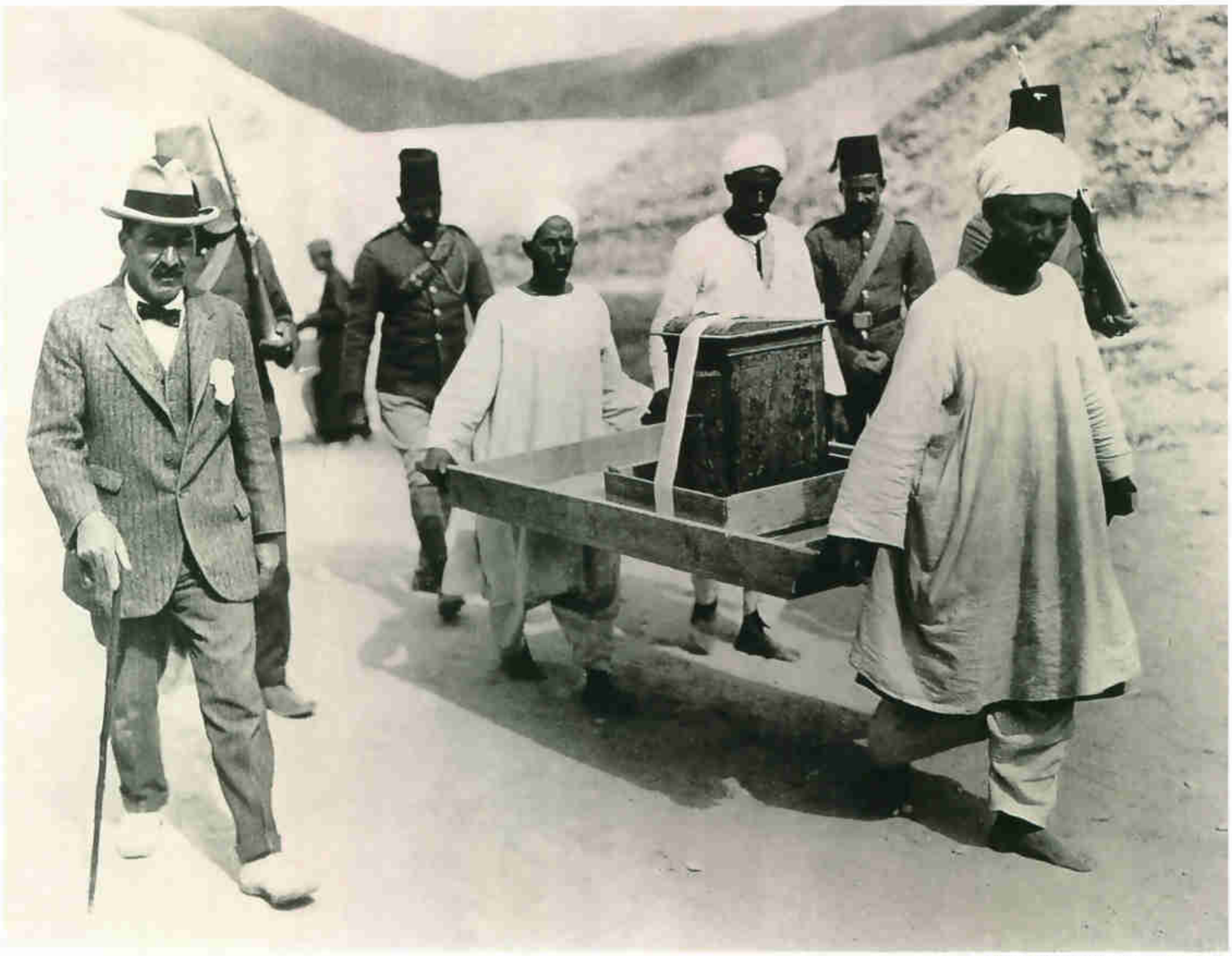
"I had to press my entire body against mud-caked walls just to get enough traction to take a step," says John Lane, who hit a dead end in Snail Shell after advancing only 120 feet in five hours. In Tardis Cave (right), Neeld Messler eyes a more tempting passage. Because of the efforts of cave explorers, plans are under way to grant protected status to Gunung Buda and its hidden treasures.



Exhausted and momentarily discouraged, Burks sits, cross-legged and spent, on the lip of the cave mouth. Below him, in the dense jungle, it is already dark. But here on the limestone face of Gunung Buda he has a private viewing of the rich, blood-red sky of the Sarawak jungle evening.

Even though Burks is disappointed that these caves lead nowhere, the idea that he may be the first human ever inside them is supremely satisfying. True to John Lane's pep talk, his efforts—like those of the others—have earned him something he can be proud of for the rest of his life. As he stares at the crimson light falling across the quilt of this ancient, deep green rain forest that he has struggled to preserve, Todd Burks grins a private smile of victory. □





HARRY BURTON © *NEW YORK TIMES*

■ FROM THE GEOGRAPHIC ARCHIVES

Carried Away by Egyptology

"Suddenly and without warning some wondrous treasure would be brought forth in its rough but easy-riding ambulance," wrote staffer Maynard Owen Williams, describing the removal of artifacts from Tutankhamun's tomb in our May 1923 issue. British archaeologist Howard Carter (in coat, tie, and white shoes) had discovered the pharaoh's burial trove in Egypt's Valley of the Kings the previous November, and Williams was among the first journalists to enter the tomb. He wrote that fellow correspondents whispered while waiting for news from the tomb, "as though the secrets of the spot would be violated by loud talk. Mystery hung as heavy on the place as mystery ever can in the full light of day." This photo was never published in the GEOGRAPHIC.

A New Way To Get Over Yonder.

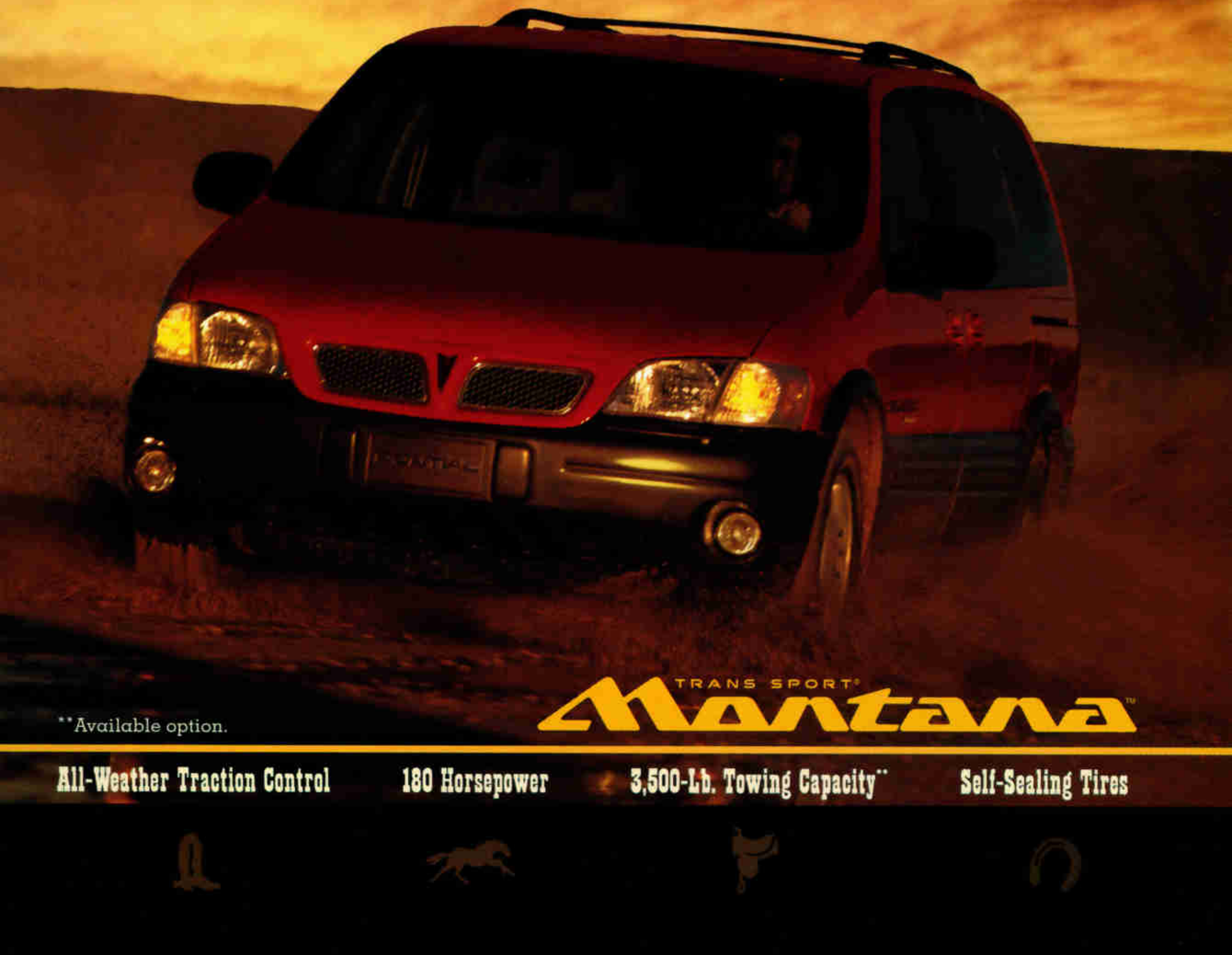


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NATIONAL GEOGRAPHIC

*On*Screen

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The young king Tutankhamun begins his journey into the afterlife 3,300 years ago surrounded by worldly splendor (below) in the meticulously researched film *Mysteries of Egypt*. National Geographic Television's first giant-screen-format project, the film tells the history of the ancient Egyptians on a scale befitting their vision: They planned grandly and built magnificently.

The epic of Egypt unfolds on IMAX screens taller than the Sphinx. Sweeping aerial views of the mighty Nile River, source of Egyptian wealth and culture, give way to overviews of the Pyramids at Giza. Viewers tour the burial chamber of a Pyramid and descend into tombs in the Valley of the Kings, where brilliant paintings tell of the pharaohs' journey through the netherworld and of the dangers they faced in their quest for eternal life.

Our guide is Egyptian actor Omar Sharif (above right). As he introduces his on-camera granddaughter to the wonders of ancient Egypt, he weaves a tale of accomplishments in astronomy, mathematics, and construction—the magic of the pharaohs' realm.



■ PROGRAM GUIDE

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C H R Y S L E R

E N G I N E E R E D T O B E G R E A T C A R S

NATIONAL GEOGRAPHIC

Earth Almanac

Migratory Birds Need a Coffee Break Too

Warblers, orioles, thrushes, and other songbirds that winter in Mexico and Central America are declining. One reason may be the change on southern coffee plantations.

For a century coffee bushes have been grown under shade trees loved by songbirds; such plantations may support 150 species. Since the 1970s, coffee grown in full sun for a higher yield has increased; shade trees have been cut down. In Mexico about 50 percent fewer songbird species are found. Conservation groups such as the Smithsonian Migratory Bird Center promote shade-grown coffee, still widely produced.



ART BY GEORGE ABE



MARTIN HARVEY, NHPA

Dingoes: Hated by Man, Menaced by Kin

Shot, trapped, and poisoned by ranchers and sheep farmers, dingoes, Australia's wild dogs (GEOGRAPHIC, April 1997), do have defenders. Ecologist Laurie Corbett says "it is inevitable that pure dingoes will become extinct in the next 50 to 100 years" due to crossbreeding with dogs. Dingoes probably sailed to Australia from Asia with traders some 3,500 years ago. Now proliferating hybrids worry farmers. *Dingoes breed once a year;* hybrids, like dogs, breed twice a year.



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Victims' Images to Go Home

In a Christmas Eve, 1995, fire 23 primates died at the Philadelphia Zoo. Vermont artist Sally Linder was moved to create 14 portraits. Inspired by photographs and zookeepers' notes, Linder's work includes Blackie, a white-handed gibbon (above), and orangutans Rita and her daughter, Jingga Gula. The artist plans to bury the paintings in Borneo, Madagascar, and Cameroon, the animals' original homes.





STEPHEN DEBAN

Salamander's Lethal Missile

A fly keeping its distance from a Supramonte Cave salamander may miscalculate. The 2.5-inch-long amphibian has a sticky two-inch tongue—longest of all salamanders. Powerful muscles launch the projectile, which contains supporting cartilage.

TEXT BY JOHN L. ELIOT

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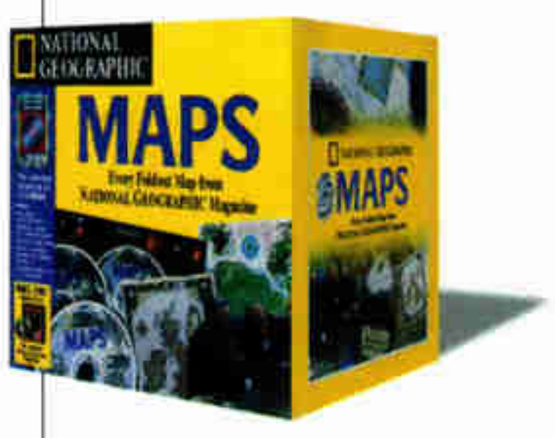
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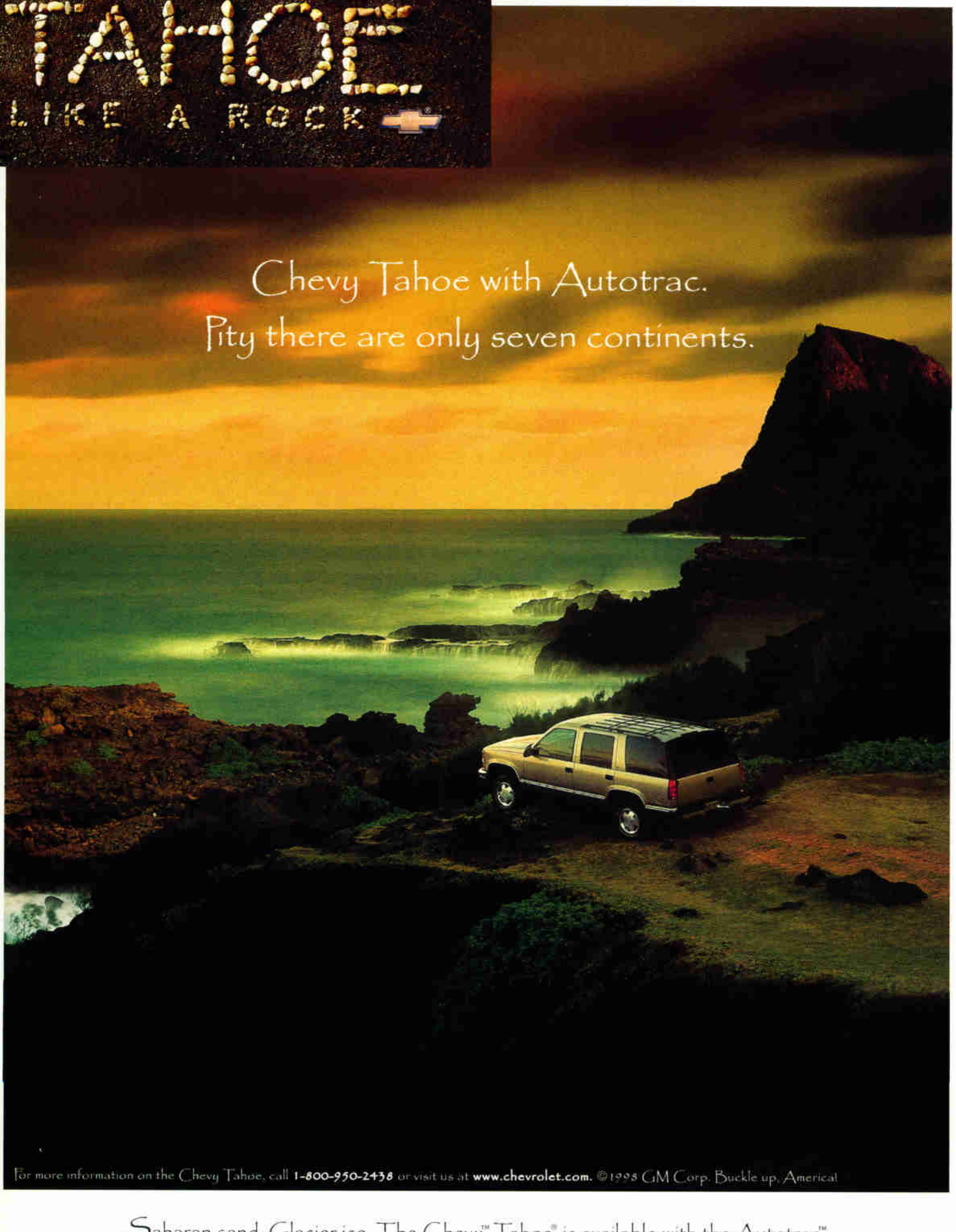


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TRISTAN AVAKIAN

■ ROMANIA

A Break in the Action

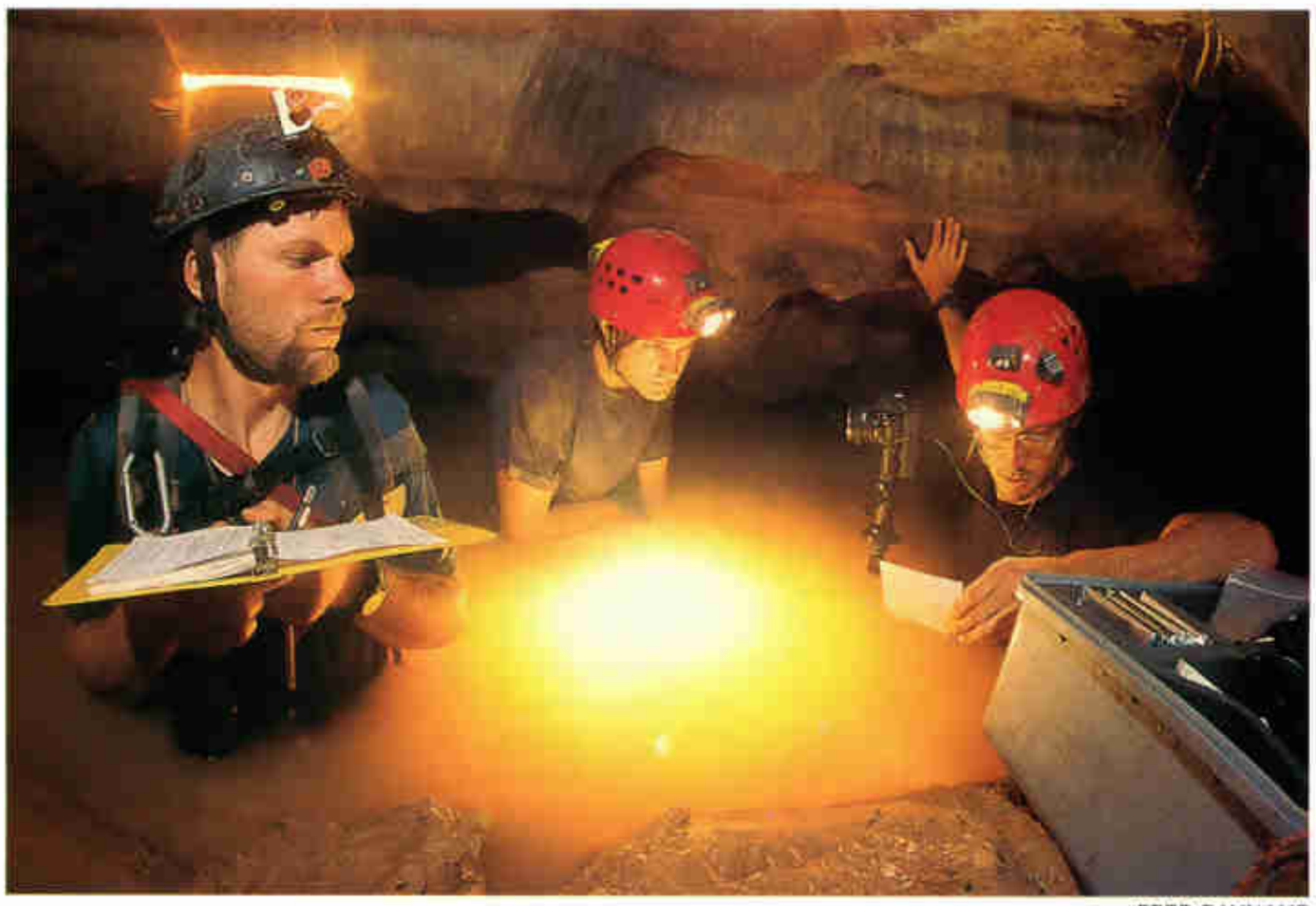
It was not the end of the road for photographer Alexandra Avakian—but it sure seemed that way. A surging crowd on a Danube ferry shoved her off the boat's boarding ramp. She was left dangling upside down above the river—her knee mangled in a wire cable. Alexandra's brother, Tristan, flew in from New York to bring her home. After surgery she endured seven months of grueling physical therapy before returning to Romania to finish the shoot.

Fascinated by photography since age 11, Alexandra took inspiration from her father, film director Aram Avakian. "I learned a tremendous amount from him about telling stories with images."

■ BORNEO CAVES

Dampened Enthusiasm

"I got used to working in waist-deep water in Borneo," says photographer Stephen Alvarez, at far right, here checking test shots in a cave with his assistant Neeld Messler, center, and expedition cartographer Chris Andrews. Swimming in a rain-swollen river there, Stephen was yanked under by fierce currents and nearly drowned. Borneo has other hazards, warns the Tennessee native. "Think of the place on your body where you'd least like to see leeches. That's just where they like to go."



FRED RAYNAUD

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TO: ALL
FROM: FRANCISCO JAVIER BERTAUD

We just spent the morning building nesting cavities for ducks. And yesterday we planted wildflowers and a new species of cactus.

That may seem a little unusual for someone who works for a Ford assembly plant but you see, I'm the official biologist. Our facility in Cuautitlan, Mexico is home to lots of wild geese, falcons, lizards, and shrikes.

Our team of 15 people works full time to preserve and enhance the wetlands and wildlife in our 260-acre compound. A few feet from where our coworkers build F-series trucks, we're planting thousands of trees and the hummingbirds are laying eggs.

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